



Lynchburg Regional Connectivity Study

Prepared for:

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Investment



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EXECUTIVE SUMMARY

APPROACH

Transportation systems and digital networks enable the flow of people, goods, and information that today's companies require to compete. Regions grow from the inside out when businesses and their workers become more productive, allowing them to provide for the region's residents and export products and services to other parts of the world. Regions also grow by out-competing other places and attracting skilled workers, successful businesses, and private investment. Under both circumstances, regional connectivity is critical for success.

This connectivity study addresses the goal of strengthening the Lynchburg regional economy, through connectivity. It first diagnoses the current role of connectivity in supporting the economy, and subsequently identifies and assesses opportunities for connectivity improvement. For the purposes of the study, the region is defined as the Lynchburg Metropolitan Statistical Area, including Amherst County, Appomattox County, Bedford County, Campbell County, Town of Bedford, and the City of Lynchburg as the urban hub.

Partners in this study include the Commonwealth Transportation Board (CTB), the Office of Intermodal Planning and Investment (OIPI), the Lynchburg District Office of Virginia Department of Transportation (VDOT), and the Region 2000 Local Government Council/Central Virginia Metropolitan Planning Organization's (CVMPO). Shannon Valentine, CTB Member (Lynchburg District), proposed the idea for the study; Rick Youngblood, Lynchburg District Planning Manager for VDOT, served as the project manager; and Bob White of Region 2000, served as the liaison with the Local Government Council and its parallel comprehensive economic development strategy (CEDS) effort.

This regional study, the first of its kind in Virginia, unfolded in two major phases:

Phase I – Baseline Assessment: This first phase of the study was a fact-finding mission aimed at answering key questions about the region's businesses; their reliance on transportation, workforce, and information infrastructure; and the connectivity issues affecting their competitiveness. Answers to these questions came from a combination of interviews with regional stakeholders and industry stakeholders; analysis of transportation, economic, and demographic data; and a comparative assessment of the Lynchburg region's performance relative to similarly sized peer regions. *Findings from Phase I of the study are presented in Chapters 2 through 4 of this report.*

Phase II – Strategies for Improvement: Following identification of connectivity challenges, assets, and opportunities in the region (*summarized in Chapter 5*), the study turned to consideration of potential improvements. This final report outlines specific strategies that address labor market access and intra-regional connectivity, connectivity between Lynchburg and markets elsewhere, and digital connectivity. These strategies draw from a combination of national best practices, existing regional efforts that can be enhanced, and particularly instructive examples from peer comparison regions. Strategies were evaluated according to their ability to generate economic gains. The Lynchburg Regional Transportation Advocacy

Group (LRTAG) provided invaluable input on these strategies and their appropriateness, attractiveness, and feasibility in the region. *Strategies and recommended actions are presented in detail in Chapter 6.*

The study has benefited from and contributed to a set of mutually supportive regional and statewide planning efforts. It builds on findings of the 2025 Virginia Multimodal Transportation Plan Needs Assessment completed as part of VTrans2040, the Commonwealth's long-range multimodal transportation plan. In particular, the connectivity study responds to a new statewide focus on the linkages between regional economies and transportation. Its detailed regional findings have in turn supported further refinement of needs and priorities within VTrans 2040. The study was also developed in parallel with a comprehensive economic development strategy (CEDS) for the region. The two processes benefited from each other through sharing of data, interim findings, and the mutual identification of opportunities. The study additionally builds on CVMPO's Long Range Transportation Plan (LRTP), adopted in October 2015. Through these coordinated efforts, each of these studies will provide more value to the Lynchburg region than if each had been developed in isolation.

FINDINGS

While this study has produced a wide array of data and information on the Lynchburg region's current and potential future connectivity, as detailed in the body of this report, there are a few important high-level themes that emerged:

FOUNDATION: *The Lynchburg region benefits from quality infrastructure and prior investments that provide a platform upon which to build towards stronger multimodal connectivity.* The region's road network provides reliable connections within the region and to external markets. Lynchburg Regional Airport, despite limitations in the number of connections offered, has maintained and even enhanced service while other regional airports in Virginia contracted as a result of airline consolidation and consolidation of service towards larger airports and larger planes. Similarly, the rail network is an asset for both passenger and freight accessibility and could be leveraged to a greater extent. Looking forward, there are a variety of economic and demographic factors indicating that the region would benefit from investing in additional multimodal connectivity. The region experienced slower growth than other similarly sized metropolitan areas in the U.S. in the period from 1998-2013,¹ is undergoing restructuring associated with shifts in its traditional economic base of manufacturing, and has struggled with young adult population growth and educational attainment, particularly in STEM fields. Table 1 summarizes the challenges, assets, and opportunities identified in this study. Lynchburg's ability to attract and retain talent will be key to the region's future prosperity. Recent population and business gains within the City of Lynchburg show positive signs in this direction.² This study outlines ways in which the region can work to address important connectivity factors that influence how desirable an area is to skilled workers, including multimodal transportation options and digital connectivity, as well as quality of place.

¹ See Table 24 in the Appendix for more detail.

² As of 2015, the City of Lynchburg was the third fastest-growing city in Virginia. See: <http://blog.opportunitylynchburg.com/insights/city-of-lynchburgs-office-of-economic-development-releases-fy-2016-annual-report>

SYNERGY and ADDED VALUE: *This study recognizes that maximum economic gains can only be achieved through synergistic, multimodal efforts that cross strategy areas.* Working from real needs identified in this and prior VTrans2040 efforts, this study highlights opportunities for a balanced and synergistic set of strategies, across modes. The study outlines a set of 23 actions, organized within eight strategy areas and three themes, as shown in Table 2. The strategies and actions are structured to protect and further leverage existing assets, including low-cost/high-impact marketing efforts, all while working to enhance areas with identified deficiencies. In addition, this study recognizes the important and significant ongoing investments in connectivity in the region³ while identifying “value-added” recommendations. The recommendations build on the research being done at the state level, leverage existing regional resources, and create opportunities for new concerted action as a region.

COMMUNICATION AND COMMON THREADS: A final theme emerging from the study is that of communication and collaboration based on shared objectives. Connectivity is inherently multi-dimensional. Many different actors, across both the public and private sectors, influence the quality of transportation and digital connectivity in the region, as well as the degree to which those connections are then translated into inclusive economic growth. This study shares common threads with other major efforts including the region’s CEDS, GO VIRGINIA (The Virginia Initiative for Growth and Opportunity), and BREC (the Blue Ridge Economic Coalition). Moreover, the ability to accurately and fully communicate about existing unique assets of the region—a key focus of the study—depends on knowledge-sharing across a broad spectrum of stakeholders. *The Lynchburg region’s success in implementing the findings of this study will depend on its continued commitment to communication and collaboration.*

Table 1 Connectivity Challenges, Assets, and Opportunities in the Lynchburg Region

Connectivity Area	Identified Challenges, Assets, and Opportunities
LABOR MARKET AND INTRA-REGIONAL CONNECTIVITY	<ul style="list-style-type: none"> 🔴 Limited labor market size 🔴 Skills gap, particularly in trades & STEM 🔴 Anticipated retirements and struggles to recruit young professionals 🟢 Comparatively short/uncongested commutes 🟢🔴 Downtown Lynchburg as an emerging but still limited regional urban core 🔴 Limitations in transit accessibility and service 🟢 Strong higher education presence
INTER-REGIONAL CONNECTIVITY	<ul style="list-style-type: none"> 🟢 Amtrak service, particularly to Washington, DC 🔴🟢 Air service connectivity 🔴 Lack of an interstate and both real and perceived remoteness 🟢 Convergence of freight rail lines with no major capacity constraints
DIGITAL CONNECTIVITY	<ul style="list-style-type: none"> 🔴 Limited broadband in rural areas 🟢 Fiber-optic connections in the urban core

Key: 🔴 Constraint; 🟢 Asset or Opportunity.

³ Virginia’s Six-Year Improvement Program for Fiscal Years 2017-2022 shows the Lynchburg District receiving \$358 million over the next six years, including investment in Virginia SMART SCALE projects, state of good repair, local projects funded through revenue sharing with the state, and safety improvements, among others.

Table 2 Strategies and Actions

STRATEGY	ACTION
THEME: LABOR MARKET & INTRA-REGIONAL CONNECTIVITY	
1. Placemaking	A. Complete/Better Streets
	B. Regional Priority Bike Corridors
	C. Improve Wayfinding
	D. Higher Education/Urban Core Multimodal Connectivity
2. Local Bottlenecks	E. <u>Intra</u> -Regional Bottleneck Relief
3. Transit & TDM	F. Enhance Business Community Outreach
	G. Commuter Rewards Program
	H. Unified Transit Pass Program
	I. Statewide Rural Vanpooling Efforts
THEME: INTER-REGIONAL CONNECTIVITY	
4. Intercity Passenger Rail	J. Amtrak Marketing, Coordinate with Tourist Destinations
	K. Advocate for Enhanced Rail Reliability and Connectivity
5. Air Service Development	L. Coordinated Regional Narrative on Lynchburg Airport
	M. Advocate for Service to Dulles (Governor's Budget), Startup Incentives
	N. Air Market Data Sharing with Colleges and Universities
	O. Economic Development "Leading Indicators" Communication
6. Access on Key Highway Corridors	P. <u>Inter</u> -Regional Key Corridor Improvements
	Q. Work with Adjacent Communities on Key Corridors
	R. Commonwealth's "Protecting Virginia's Arterial Investments" Program
7. Cargo-Oriented Development	S. Build Awareness of Virginia Rail Industrial Access Program
	T. Focus on Sites Adjacent to Existing Rail Infrastructure and Customers
	U. Ongoing Communication with Class I Railroads
THEME: BROADBAND CONNECTIVITY	
8. Broadband Development	V. Market the Fiber Network in Economic Development Efforts
	W. Expand Broadband to Rural Areas

1. INTRODUCTION

MOTIVATION AND CONTEXT

The Lynchburg region's future prosperity depends on its ability to improve the productive capacity of its regional economy and better compete with other areas, all while ensuring that growth is inclusive and benefits are shared among all residents. Regions achieve growth through businesses and worker productivity, which allow the economy to provide for the region's residents and export products and services to external markets. Regions also grow by attracting skilled workers, successful businesses, and private investment. Under both circumstances, regional connectivity is critical for success. Transportation systems and digital networks enable the flow of people, goods, and information that have become even more important than in the past as companies compete in an increasingly national and global market place. When connectivity is lacking, commerce suffers and regions struggle to generate job opportunities, livable wages, and overall opportunity.

This study comes at a unique and opportune time for Lynchburg, having been developed at the same time as a comprehensive economic development strategy (CEDS) for the region. The two studies—which differ in their specific focus but have a mutual goal of promoting economic development—benefited from each other through sharing of data, interim findings, and the mutual identification of key opportunities. This study also represents a new form of collaboration among state and regional entities in Virginia. Vtrans2040, the ongoing statewide transportation plan, and in particular the recently completed 2025 VMTP Needs Assessment, brought a new statewide focus on the linkages between regional economies and transportation. This study builds on the knowledge gained in the Statewide process, taking the opportunity to dive more deeply into region-specific connectivity conditions and industry needs.

STUDY APPROACH AND OUTCOMES

Defining Connectivity

Today's global economy depends on the rapid and reliable transfer of people, goods, and information. This march toward an ever more mobile, connected economy is evident in everyday life: Workers advocate for well-functioning transit systems and reliable roadways for their daily commute. Consumers expect products purchased online to ship immediately and arrive at their doorstep within days. Businesses across all industry sectors now transmit and store massive amounts of information needed to make everyday decisions. Connectivity is at the heart of these movements and transactions, and it is useful to thinking of the concept as having three dimensions:

- **Movement of people:** Passenger connectivity is a precondition for quality of life and economic opportunity. It allows us to reach the places we need to go. Workers need to reach their jobs, students need to reach their places of education, and everyday citizens need to reach doctors, stores, and recreational and social opportunities. The goal of focusing on passenger connectivity is to understand and provide the means necessary for travel, across multiple modes and geographic scales.

- **Movement of goods:** Freight connectivity is what businesses rely on to obtain necessary supplies to operate their businesses, and to ship their goods to consumers and other end product users (e.g., other businesses). Freight shares some infrastructure with passenger vehicles, and also relies on certain dedicated freight facilities. While freight connectivity is less visible to the general population, it is no less important than passenger connectivity for economic growth and development.
- **Movement of information:** We live in an information age that allows us to communicate instantly with people located around the world. Information connectivity depends on broadband networks to transmit information securely and at high speeds. Regional economies benefit when residents and businesses can engage in the global exchange of information.

Study Phases

The overall purpose of this study is to strengthen the Lynchburg regional economy by first diagnosing the current role of connectivity in supporting the economy, and subsequently identifying and assessing opportunities for improvement. The study therefore unfolded in two phases: a baseline assessment and a process of strategy-development that builds on research findings and successful experience from other similar communities. The baseline assessment includes an overview of conditions and trends in Lynchburg’s regional economy; an examination of the relationships between connectivity and economic development; and a process of collecting qualitative input from regional stakeholders and the business community. The purpose of a baseline assessment is to provide readers with an understanding of how the region is performing today and an appropriate context for the strategic recommendations that follow. The recommendations grow directly out of the baseline assessment, and are responses to challenges and opportunities that the research exposed.

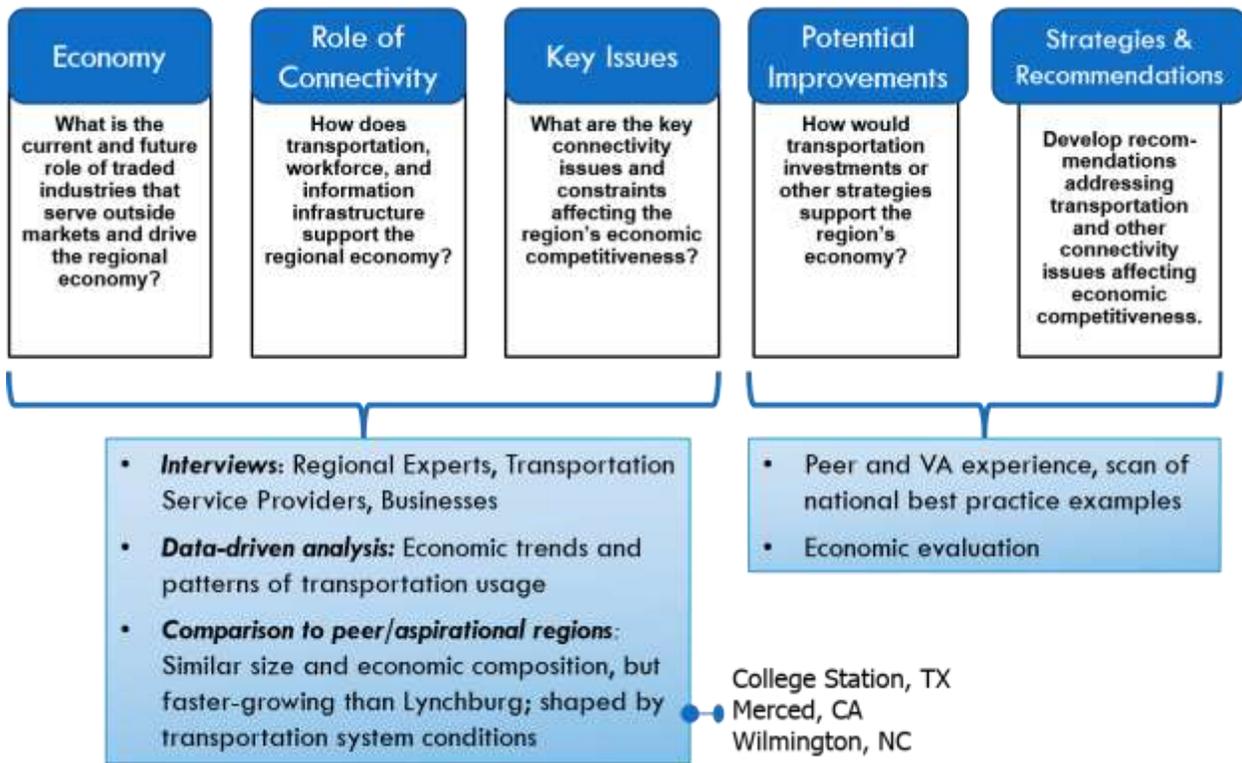
Research Questions and Methods

Several research questions form the basis for this study, each listed at the top of Figure 1. The first three questions—about the economy, role of connectivity, and key issues in the region—drive the study’s baseline assessment. Answers to these questions come from a combination of interviews, “data-driven” analysis, and comparative work. The second two questions or objectives that drive this study—about identifying improvements and developing strategic recommendations—are addressed using best practices and economic evaluation.

Interviews

Interviews with various stakeholders in government, the business community, and the transportation sector itself help establish factors of economic success, the overall role of transportation, and constraints on growth. Interview findings also illuminate the importance of non-transportation connectivity, including the availability of communications infrastructure and the social and institutional connections that undergird a strong workforce. Each interview was organized into two parts, the first focused on current operations and connectivity conditions, and the second targeting emerging issues. Appendix 1 contains full interview guides. The study team conducted interviews in February and March of 2016, with follow-up review by interviewees in July and August.

Figure 1. Research Questions and Methods



Data Analysis

There is a wealth of secondary data on Lynchburg’s economy, infrastructure, and peer regions. Additionally, academic research is filled with findings on economic success factors that provide support for the study’s strategic recommendations. The challenge comes in combining this disparate information in a way that is insightful and useful for further research. The research team utilized the following types of information over the course of this study, among others:

- Socioeconomic and demographic data publicly-available through the U.S. Bureau of Labor Statistics and U.S. Census Bureau;
- Industry data from the U.S. Bureau of Economic Analysis and private sources including The Brookings Institution, IMPLAN Group, LLC, Moody’s Analytics, and U.S. Cluster Mapping Project;
- Transportation data from private and public sources including Transearch freight flow data,⁴ data provided by USDOT, and data collected in the course of state and regional studies and plans;
- Academic research on economic development, transportation, and urban planning.

⁴ Utilized independently and within the TREDIS fueled by Transearch modelling system. More information is available here: <http://tredis.com/products/tredis-freight>

Peer Region Comparison

The research team conducted a peer region analysis that considered how three similarly-sized regions perform relative to Lynchburg and distributed the findings throughout the report. The selected peer regions are the metropolitan areas of College Station-Bryan, TX; Merced, CA; and Wilmington, NC. Appendix 2 contains the full analysis results. These regions are peers in one sense, but also aspirational insofar as they are performing better than Lynchburg on one or more given measures or set of measures. Juxtaposing performance measures across various regions exposes specific opportunities for improvement—performance gaps—that Lynchburg can work to address. Comparison regions were selected in a way that ensures similar population size and economic structure, meaning this assessment is more likely to uncover actionable opportunities than grandiose, unrealistic targets. Like Lynchburg each peer region has a significant higher education presence and together the peer regions reflect key aspects of Lynchburg’s connectivity characteristics (e.g. the lack of an interstate in some cases, and the presence of Amtrak rail service and regional non-hub airports). Regions were compared using a variety of performance measures that fall under the following categories:

- Cost of doing business
- Connectivity and market access
- Innovation
- Human capital
- Quality of life

Economic development planners and the corporate site selection community employ many of the measures considered. U.S. Economic Development Administration guidance, for example, recommends using several of the selected measures for regional SWOT analyses, and *Area Development* and *Site Selection*, both leading magazine publications, use similar measures to rank business-friendly states. Each category listed above is important in its own right; there is no single performance measure that determines or explains a region’s prosperity. Instead, research shows that multiple factors illuminate why some areas succeed while others struggle.

REPORT ORGANIZATION

The remainder of this report is organized as follows: Chapters 2 through 4 comprise the findings of the baseline assessment, examining in turn the regional economy, the role of connectivity in the economy, and the perspectives of regional stakeholders regarding connectivity and regional competitiveness. Chapter 5 then synthesizes these findings into a succinct presentation of key challenges, assets, and opportunities facing the region. Chapter 6 presents the culminations of the study in the form of strategies and recommended actions. While the chapters do build upon each other, readers with specific interests may choose to navigate to a particular chapter without reading the entirety of the report.

2. LYNCHBURG REGIONAL ECONOMY

This chapter provides a baseline assessment of the Lynchburg regional economy, answering the following questions: What is the current and future role of traded industries that serve outside markets and drive the regional economy? How does Lynchburg perform, in economic terms, relative to peers?

POPULATION TRENDS

Approximately 257,600 people live in the Lynchburg region, placing the region below that of nearby Roanoke but above places like Charlottesville and the New River Valley (Table 3).⁵ By population size, Lynchburg ranks sixth out of Virginia's 11 metros. From 1998-2013, years that include periods of economic contraction (recessions) and expansion, the Lynchburg region grew by 0.9 percent.⁶ Compared with Virginia's other metro areas, Lynchburg's growth during this period places it in the middle of the pack. Growth among Virginia metros averaged 1 percent during this period, and Lynchburg grew at three times the rate of the Bristol metro but less than half the rate of the Winchester metro.

The authors of a September 2016 editorial in *The Roanoke Times* analyzed recently-published migration data from the U.S. Census Bureau, finding that slightly more people moved from Roanoke to Lynchburg than the reverse during a four-year period ending in 2013.⁷ Lynchburg also has a younger population than Roanoke, and since 2010 has logged significantly more births than deaths than has its slightly-larger neighbor—an indicator of future growth. Taken together, these findings reveal a demographic shift that could reverse what has been a downward trend in the region's young population in recent years.⁸ Recent demographic data from 2015 also show that the City of Lynchburg itself is the third fastest-growing city in Virginia, a positive signal for the region as a whole.⁹

⁵ Based on American Community Survey 2014 1-Year Estimates for the Lynchburg MSA

⁶ According to the National Bureau for Economic Research (see <http://www.nber.org/cycles.html>), data for the Lynchburg MSA.

⁷ "Editorial: How Roanoke gets 'Lynchburg -ed,'" *The Roanoke Times*, September 18, 2016, http://www.roanoke.com/opinion/editorials/editorial-how-roanoke-gets-lynchburg-ed/article_8c634765-b9ab-541c-a1fa-95d99b054456.html.

⁸ U.S. Cluster Mapping Project

⁹ Opportunity Lynchburg. Economic Overview in Lynchburg FY 2016.

<http://blog.opportunitylynchburg.com/insights/city-of-lynchburgs-office-of-economic-development-releases-fy-2016-annual-report>

Table 3. Population of Other Virginia Metros and their Rate of Population Change

Region	Population, 2014	Population Change, 1998-2013
Washington-Arlington-Alexandria, DC-VA-MD-WV Metro Area	6,032,744	1.5%
Virginia Beach-Norfolk-Newport News, VA-NC Metro Area	1,717,387	0.6%
Richmond, VA Metro Area	1,260,668	1.3%
Roanoke, VA Metro Area	312,837	0.6%
Kingsport-Bristol-Bristol, TN-VA Metro Area	308,590	0.3%
Lynchburg, VA Metro Area	257,600	0.9%
Charlottesville, VA Metro Area	227,738	1.4%
Staunton-Waynesboro, VA Metro Area	119,766	0.7%
Blacksburg-Christiansburg-Radford, VA Metro Area	181,249	0.7%
Harrisonburg, VA Metro Area	130,649	1.4%
Winchester, VA-WV Metro Area	134,221	1.9%

Source: Population comes from the American Community Survey 2014 1-Year Estimates; population change comes from the U.S. Cluster Mapping Project

INDUSTRY EMPLOYMENT TRENDS

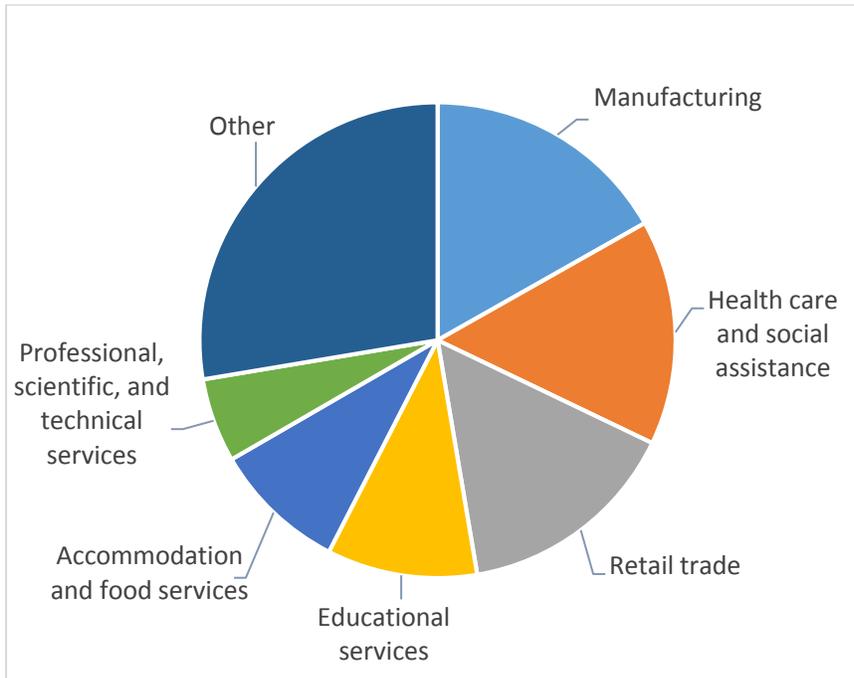
From 2009-2013, total employment in the Lynchburg region fell by 2.2 percent while Virginia’s total employment increased by 2.6%.¹⁰ The similarly-sized peer regions of College Station, TX; Merced, CA; and Wilmington, NC experienced positive employment growth during this period. In 2005, one out of every five of Lynchburg’s jobs was in manufacturing while today 16-17 percent are, depending on the data source used (see Figure 2).¹¹ By 2025, forecasts suggest that just 14 percent of jobs will belong to this industry sector. The Lynchburg Metropolitan Statistical Area (MSA) lost over 4,000 manufacturing jobs between 2005 and today, and forecasts indicate the loss of several hundred more by 2025.¹²

¹⁰ Moody’s Analytics. Data obtained in October of 2016. All forecast data included in this section is sourced from Moody’s Analytics.

¹¹ Moody’s Analytics and County Business Patterns, a program of the U.S. Bureau of Labor Statistics.

¹² The Lynchburg MSA includes Amherst County, Appomattox County, Bedford County, Campbell County, Bedford city, and Lynchburg city.

Figure 2. Major Private Employment by Industry Sector, 2013



Source: County Business Patterns, U.S. Census Bureau.

Filling much of this gap is the healthcare sector, which provided 13 percent of the region’s jobs in 2005 and is expected to provide 18 percent by 2025. Healthcare provides around 15,000 regional jobs today—15-16 percent of regional employment—approximately 40 percent of which are in ambulatory health care services (i.e., physicians, dentists, home healthcare services, etc.). Unlike manufacturing, which is a traded industry, health care is predominantly local-serving.

Industries serving local residents and tourists have also contributed a greater share of jobs to the Lynchburg region over time and will continue to do so, according to forecasts. Businesses in this sector include restaurants, hotels, museums, and historic sites. These industries provide over 10,000 jobs in the region, approximately 85 percent of which are in restaurants and bars.

Performance of the region’s construction sector, which also serves local residents, slowed significantly during the last decade, which included the Great Recession and housing market crisis. Between 2005-2015, the sector lost one-fifth of its jobs. Today the sector provides over 5,000 jobs. Forecasts are bullish with regard to a construction rebound, projecting that the sector will gain back its losses by 2025. Specialty trade contractors, who make up nearly 70 percent of the sector’s total employment, will drive future growth in absolute terms—possibly adding over 800 jobs. These contractors include plumbers, electricians, and painters. While employing relatively few, infrastructure construction employment is forecast to grow by 36 percent between now and 2025 while employment in building construction is expected to grow by 13 percent.

Financial, insurance, real estate, and other professional services will continue to provide about one-fifth of all jobs in the Lynchburg region—over 17,000 today and potentially over 20,000 in 2025. The educational services sector provides one-tenth of all non-government jobs in the region¹³, with Liberty University employing approximately 4,300 as of 2012.¹⁴ Forecasts suggest that employment in the region's educational services sector will grow by 3 percent between now and 2025.

Within the manufacturing sector, firms producing fabricated metal products and machinery provided 18 percent of all regional manufacturing jobs in 2005 and will provide a projected 33 percent in 2025. At the same time, however, the *number* of jobs in each of these industries is forecast to decline between now and 2025. According to projections, these industries will provide 12 percent fewer jobs in 2025 than they do today, and combined employment could amount to less than 5,000. These trends are associated in part with industry productivity gains, as discussed in the following section.

Forecasts suggest that paper and primary metal (iron and steel) manufacturers, as well as textile mills and textile product mills, will each comprise a smaller share of regional employment in years to come. Each of these sectors shed jobs by double-digit percentages between 2005 and today, with textile mills hit particularly hard, but forecasts suggest that their contraction will slow by 2025. Together, these industries provided over 2,100 jobs in 2005, but today provide around 1,200. Wood product and furniture manufacturers are forecast to experience modest declines, together providing 9 percent fewer jobs in 2025 than today. Today, these industries provide close to 1,100 jobs in the Lynchburg region.

Several industries in Lynchburg have historically experienced minimal employment volatility and will likely remain stable throughout the next decade. The agriculture sector has held steady at approximately 3 percent of the region's total employment. Mining and utilities combined provide less than 1 percent of jobs in the region, and this share will likely remain the same through 2025. Retail and wholesale trade together provide between 15-18 percent of regional jobs, and forecasts suggest that these industries will experience little change in employment during the next ten years, perhaps adding several hundred jobs. Transportation and warehousing comprises between 2-3 percent of the region's jobs, a proportion expected to remain relatively the same through 2025.

Finally, a number of other industry sectors including repair and maintenance (e.g., automotive repair), personal and laundry services (e.g., salons), religious organizations, and government show relative stability in their share of the regional employment base since 2005 and will likely remain unchanged throughout next decade. This is because these sectors depend on consumer spending and local government spending, both of which are relatively stable.

¹³ County Business Patterns, U.S. Census Bureau, 2013.

¹⁴ Magnum Economic Consulting, LLC, 2012, *Analysis of the Economic Contribution that Liberty University makes to the Lynchburg MSA and to Virginia*, Richmond, VA: Magnum Economic Consulting, LLC.
<http://www.liberty.edu/media/1617/2012/december12/Liberty%20Univ%202012%20Economic%20Impact%20Assessment.pdf.pdf>

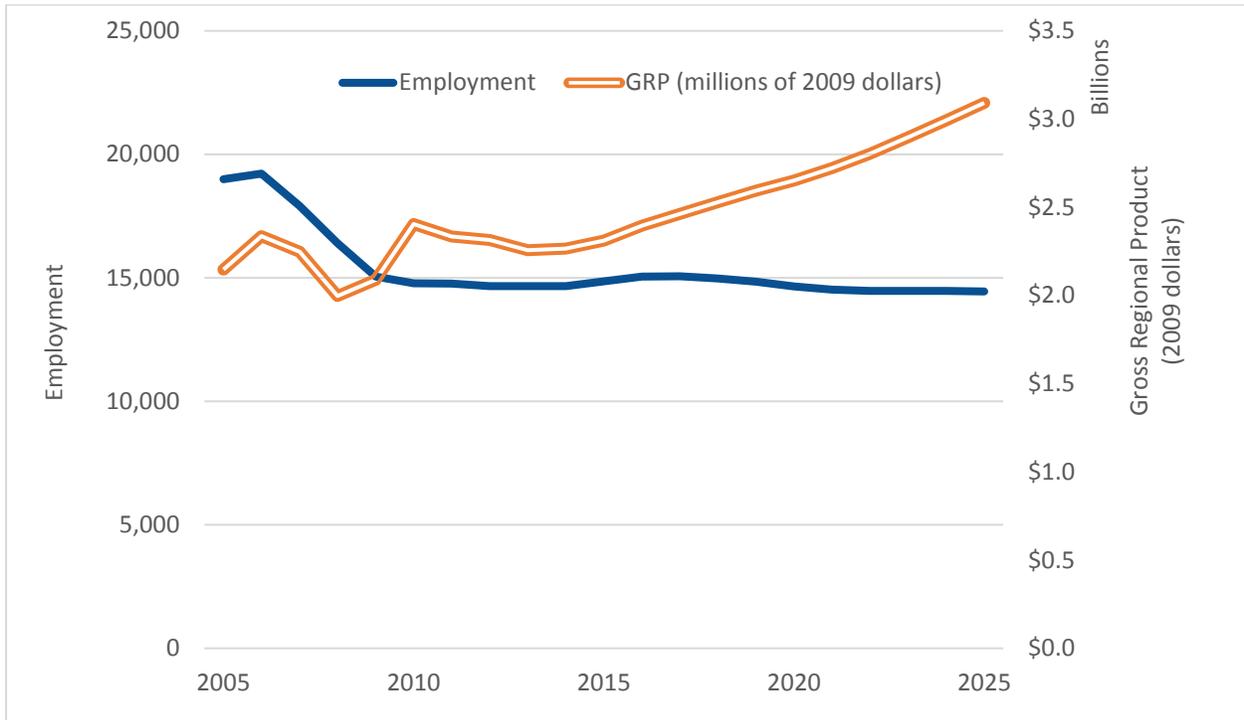
To summarize, economic forecasts predict that construction, certain business services, education, healthcare, and retail and wholesale will provide the majority of the region's employment growth over the next decade while most manufacturers continue to shed jobs.

INDUSTRY PRODUCTION AND LABOR PRODUCTIVITY TRENDS

There are several ways to measure industry performance, and a common misperception is that U.S. manufacturing is declining on all fronts. In reality, Lynchburg's regional manufacturing sector produces more today than it did in 2005, as measured in dollars of gross regional product (GRP), and forecasts indicate that this upward trend will continue. In fact, Lynchburg's GRP has recently increased when measured across *all* industries, growing by 1.4 percent from 2009-2013. This compares to 3.6% for Virginia as a whole. Lynchburg's peers also experienced stronger growth during this period, with GRP growing by 14.6 percent in College Station, 3.1 percent in Merced, and 8.9 percent in Wilmington. In this study, GRP represents the value of all finished goods and services produced within the Lynchburg MSA. Importantly, GRP measures the value added during production processes, i.e., the value of final production minus the value of intermediate goods and services used in production.

The reason that Lynchburg's regional manufacturing sector produces more today than it did in 2005 but provides fewer jobs is because labor productivity has increased (see Figure 3). In this analysis, labor productivity is calculated as GRP per worker, and actions that influence its rise or fall include the adoption of new technology and investments in human capital (i.e., worker skills and education). Between 2005-2015, average labor productivity in The Lynchburg region's manufacturing sector rose from approximately \$125,000 of GRP per worker (in 2015 dollars) to nearly \$172,000 today. According to forecasts, regional labor productivity in this industry sector could exceed \$236,000 in 2025. By comparison, in Virginia overall manufacturing labor productivity was approximately \$142,000 in 2005, increased to \$176,000 by 2015, and is forecast to grow to \$231,000 in 2025.

Figure 3. Employment and Gross Regional Product in the Lynchburg Region’s Manufacturing Sector



Source: Moody’s Analytics

The Lynchburg region’s food manufacturing industry experienced significant growth in labor productivity from 2005-2015. This industry drove much of the sector’s overall productivity growth during the last ten years. During this period, industry GRP expanded by 56 percent and employment by 24 percent. Food manufacturing forecasts predict GRP increases but falling employment between today and 2025, meaning that productivity will continue to increase. Overall, forecasts suggest rising productivity in each of the region’s manufacturing industries.

The transportation and warehousing sector in Lynchburg also experienced productivity gains from 2005-2015. Within this sector, the rail and truck transportation industries contribute over 45 percent of value added and will likely continue to do so in 2025. These industries comprise a slightly smaller share of regional employment within transportation and warehousing, indicating that they are more productive relative to other industries within the sector. Financial, insurance, real estate, and other professional services in the Lynchburg region produce even more value added per worker than the manufacturing sector, on average. This is largely associated with value added reported in the real estate industry, but also reflects the highly productive telecommunications and management industries.

Figure 4. Gross Regional Product (2015 dollars) per Worker by Major Industry Sector in the Lynchburg Region, 2005-2025

Industry Sector	2005	2015	2025
Agriculture	\$32,900	\$36,800	\$57,800
Construction	\$105,500	\$95,700	\$106,900
Manufacturing	\$124,900	\$171,800	\$236,400
Retail & Wholesale	\$62,500	\$67,800	\$87,300
Transportation & Warehousing	\$133,700	\$166,600	\$225,600
Business Services*	\$166,800	\$201,700	\$244,100
Education	\$45,100	\$46,700	\$57,800
Healthcare	\$67,100	\$70,900	\$76,300
Local-Serving & Tourism**	\$40,300	\$34,900	\$37,900
Other***	\$100,500	\$104,400	\$124,900

Source: Moody's Analytics. Figures rounded to the nearest 100.

*Includes Information; Finance and Insurance; Real Estate and Rental and Leasing; Professional, Scientific, and Technical Services; Management of Companies and Enterprises; and Administrative and Support and Waste Management and Remediation Services

**Includes Arts, Entertainment, and Recreation and Accommodation and Food Services

***Includes Mining, Quarrying, and Oil and Gas Extraction; Utilities; and Other Services (except Public Administration)

Wholesale trade is another highly and increasingly productive industry sector that also employs several thousand workers in the region. Durable goods wholesalers experienced productivity growth of 33 percent between 2005-2015, and forecasts indicate a gain of 70 percent between now and 2025. Durable goods include motor vehicles, furniture, lumber, and machinery. Similarly, wholesalers of nondurable goods such as paper products, apparel, and books experienced productivity growth of 24 percent between 2005-2015 and can expect an additional 71 percent increase by 2025.¹⁵ Companies have become more productive as online customers demand rapid order-fulfillment (i.e., the time it takes from ordering a product to having it delivered).¹⁶

Labor-intensive industries generally experience lower productivity growth over time than capital-intensive industries.¹⁷ Industries and industry sectors that typically fall into this category include retail trade, education, and healthcare, as well as repair services and personal services. This concept is important to understand because while labor productivity among these industries will still increase over the next decade in Lynchburg, according to forecasts, gains will come through investments in human capital more so than through the adoption of new technologies.

¹⁵ The U.S. Bureau of Labor Statistics generally considers durable goods to be those with a life expectancy of three years or more, and nondurable goods to be those with a life expectancy of less than three years.

¹⁶ This is based on an interview with a J. Crew manager on February 17, 2016.

¹⁷ A firm's labor-intensity represents the ratio of labor costs (wages) to total operating costs.

TRADED INDUSTRIES AND REGIONAL COMPETITIVENESS

Certain groups of industries in the Lynchburg region stand out as being particularly competitive. The following analysis focuses on traded clusters that employ a disproportionately high number of workers relative to their share in the U.S. and sell goods and services to other parts of the country and world. Exports are important to regional growth because exports bring dollars into Lynchburg's regional economy and clusters themselves are important because a geographic concentration of interrelated firms creates additional benefits for regional economies. When businesses locate near one another, they benefit from shared inputs like raw materials; a shared pool of qualified workers; and the exchange of knowledge and ideas among employees, each of which is associated with higher productivity. Figure 5 describes the Lynchburg region's export clusters using the following dimensions:

1. Bubble sizes show the relative number of workers employed by each cluster. All clusters except for telecom employ at least 750 workers.¹⁸ Remember that this chart includes export clusters only; healthcare, for example, is one of the largest employers in the Lynchburg region, but it does not employ a disproportionate number of workers relative to the nation.
2. The horizontal axis shows the rate at which a given cluster grew or shrunk, in employment terms, at the regional level between 1998-2013.
3. The vertical axis shows the rate at which a given cluster grew or shrunk, in employment terms, at the national level between 1998-2013.

The clusters included in this analysis are based on cluster definitions from the US Cluster Mapping project, an initiative led by Harvard Business School's Institute for Strategy and Competitiveness in partnership with the U.S. Department of Commerce and U.S. Economic Development Administration.¹⁹ The clusters are grouping of related traded industry sectors, defined at a fine level of industry detail to capture inter-industry linkages.²⁰

Taken together, the two axes create four quadrants that each provide important insights into the performance of Lynchburg's regional clusters. Clusters in the upper-right quadrant include higher education, business services, support for nuclear energy generation, and biopharmaceuticals. Based on long-term trends, these clusters are growing nationally and regionally. The region's higher education and business services clusters are two of the largest by employment: in 2013, the higher education cluster employed around 9,000 workers while the business services cluster employed close to 5,500. The business services cluster supports other businesses by providing "consulting, legal services, facility support

¹⁸ Telecom is included to cover the known concentration of activity in the region associated with firms such as the Haris Corporation.

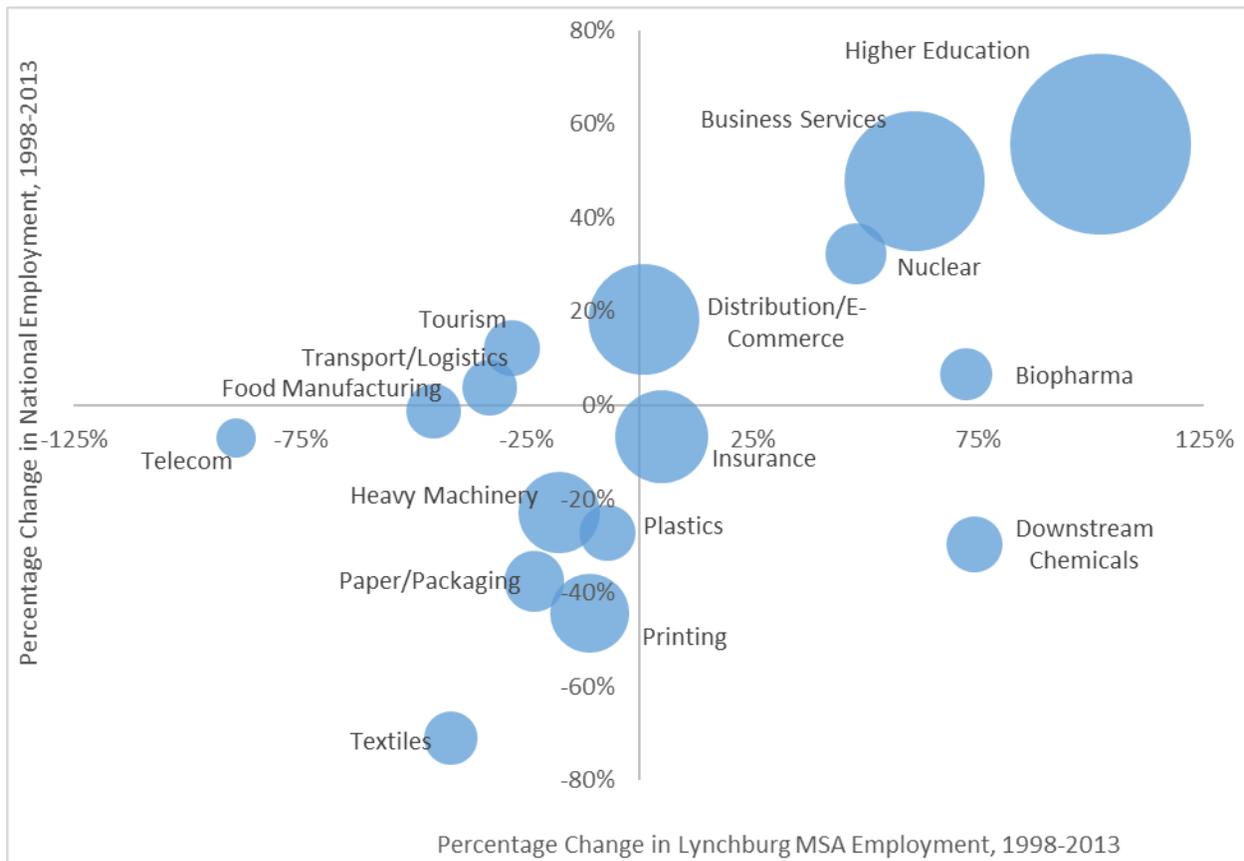
¹⁹ More information available here: <http://www.clustermapping.us/about>.

²⁰ Detailed methodological information available at: <http://www.clustermapping.us/content/cluster-mapping-methodology> (See the Traded Clusters Appendix for cluster definitions in terms of their included NAICS industry sectors).

services, computer services, engineering and architectural services, and placement services.”²¹ These clusters represent an opportunity for further encouragement and growth.

Biopharmaceuticals experienced significantly higher growth in the region than nationally between 1993-2013, indicating that the cluster’s future growth could slow to rates that are more in line with broader trends. Lynchburg’s downstream chemicals cluster has also defied national trends, growing regionally while declining nationally. Establishments in this cluster manufacture chemical products for end users, including personal care products such as those manufactured by KDC in Lynchburg. While this represents a past success story, future expectations should be tempered by knowledge of the broader national contraction in this sector. Clusters in the upper-left quadrant represent opportunities for the Lynchburg region. The tourism and transport and logistics clusters are growing nationally but declining regionally, meaning that more local growth may be possible. Together these clusters employ close to 1,700 workers.

Figure 5. Export Clusters in the Lynchburg Region



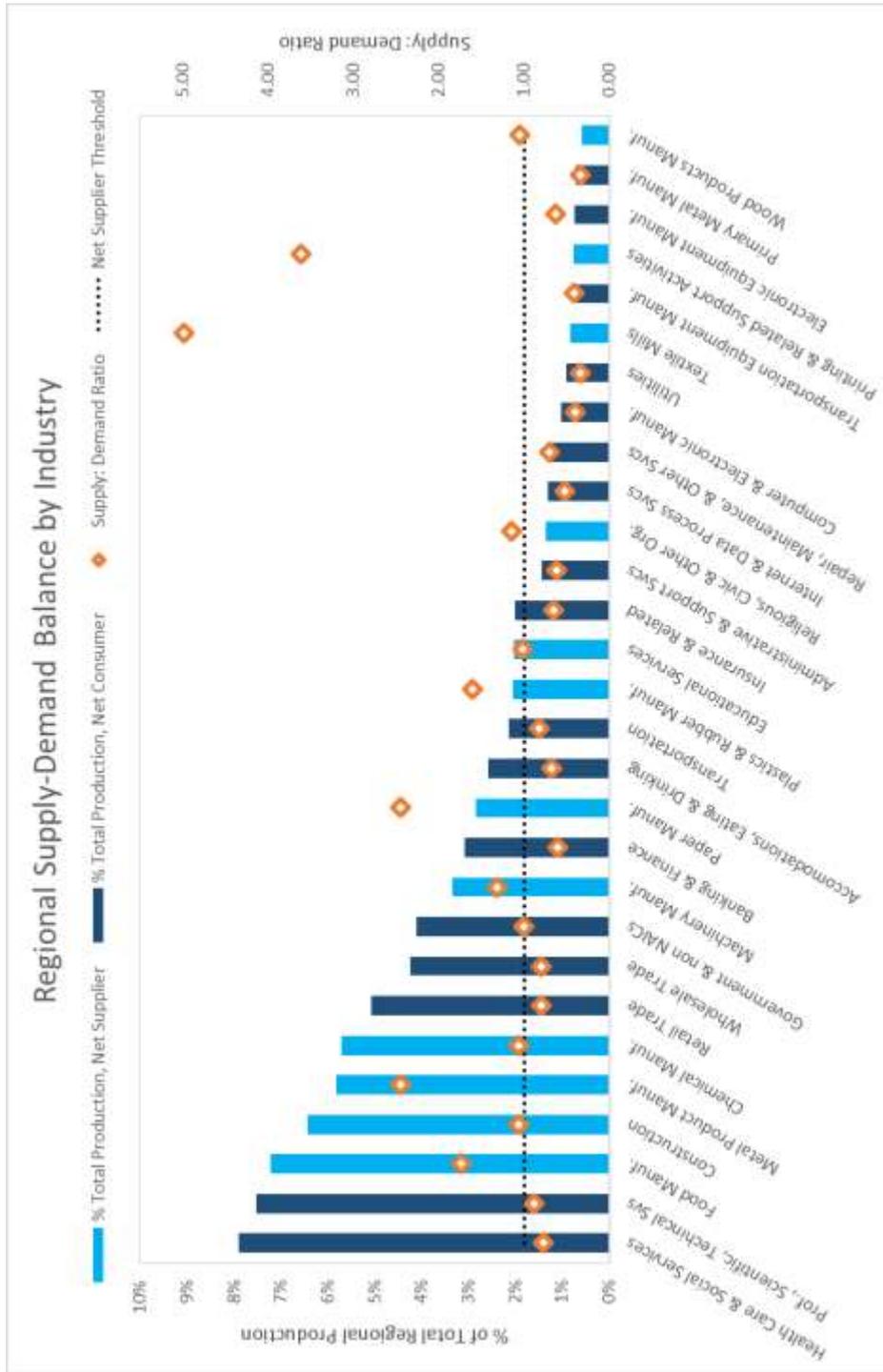
Source: U.S. Cluster Mapping Project

²¹ <http://clustermapping.us/sites/default/files/files/page/Traded%20Clusters%20Appendix.pdf>

The lower-left quadrant includes clusters that have shed jobs nationally and regionally. It is important to note, however, that the following clusters have been more resilient in the Lynchburg region than they have been nationally: heavy machinery, paper/packaging, plastics, and printing. Note also that this analysis also does not account for growth in industry production and labor productivity, as discussed previously. While manufacturing is shedding jobs, it has still performed well in terms of regional value add.

Another way of identifying traded industry sectors is to compare the dollar value of total production and consumption within the Lynchburg region, for specific industry sectors. The analysis in Figure 6 makes use of regional economic data from the IMPLAN modelling system, disaggregated to industry sectors at the 3-digit NAICS industry level. Vertical bars for each industry correspond to that industry's share of overall regional production, as measured by the left axis. The orange diamonds correspond to the right axis and represent the relative ratio of goods produced to goods consumed in the region, by industry. A ratio of greater than one (as marked by the horizontal dotted line) indicates an industry that is a net supplier. The analysis identifies notable manufacturing sectors that produce more in the Lynchburg region than is locally demanded. These include: food, metal products, chemical, machinery, and paper manufacturing. Food manufacturing includes businesses such as Westover dairy, Flower baking company, and the Gunnoe sausage company. The metal products manufacturing sector covers some manufacturing activities in the nuclear sector, as well as firms such as Wegmann (a defense contractor) and Banker Steel. Chemical manufacturing covers both the pharmaceutical and personal products industries, with firms such as C.B. Fleet, Abbott, and Teva represented. Firms classified as machinery manufacturing include Automated Conveyor Systems, Sentry Equipment Erectors, and AMTI. Georgia Pacific Big Island is a major paper manufacturing firm in the region.

Figure 6 Regional Supply-Demand Balance by Industry



Source: EDR Group analysis using IMPLAN data.

WORKFORCE AND THE STEM ECONOMY

Another lens through which to view the Lynchburg regional economy is that of STEM-intensity (science, technology, engineering, and math). A recent report entitled “The Hidden STEM Economy” from the Brookings Metropolitan Policy Program makes the case that more STEM-oriented metropolitan economies perform better in the long-run in terms of job growth, employment rates, patenting, wages, and level of exports.²² Moreover, STEM jobs are not constrained to those requiring at least a bachelor’s degree. In fact, half of all STEM jobs nationally are available to workers without a four-year college degree and pay \$53,000 on average, 10 percent higher than other jobs with similar educational requirements. This is important given that less than a third of Lynchburg residents over the age of 25 have a college degree (associate’s included), compared with 43 percent in Wilmington, 39 percent in College Station, and 20 percent in Merced.

Brookings used worker survey data, along with other information on training, education, experience, and skill-related work requirements, to classify occupations by their level of required STEM knowledge. Using the top five STEM-intensive occupations identified by Brookings (Table 4), along with information from the Bureau of Labor Statistics on the relationship between industries and occupations, and information on industry composition within the Lynchburg region, it is possible to identify sectors that have particularly strong STEM intensity in the regional economy. Figure 7 presents results from this analysis. In the figure, the height of the bars relative to the left axis represents the percentage of jobs within each sector that are in STEM occupations. The height of the vertical diamonds relative to the right axis represent the share of regional jobs within that specific industry sector. For example, just shy of 60 percent of jobs in hospitals are STEM intensive, and hospitals account for approximately 3 percent of overall regional employment. Industries are ranked from left to right by their level of STEM intensity.

Table 4: Major occupational categories by share of jobs that are STEM

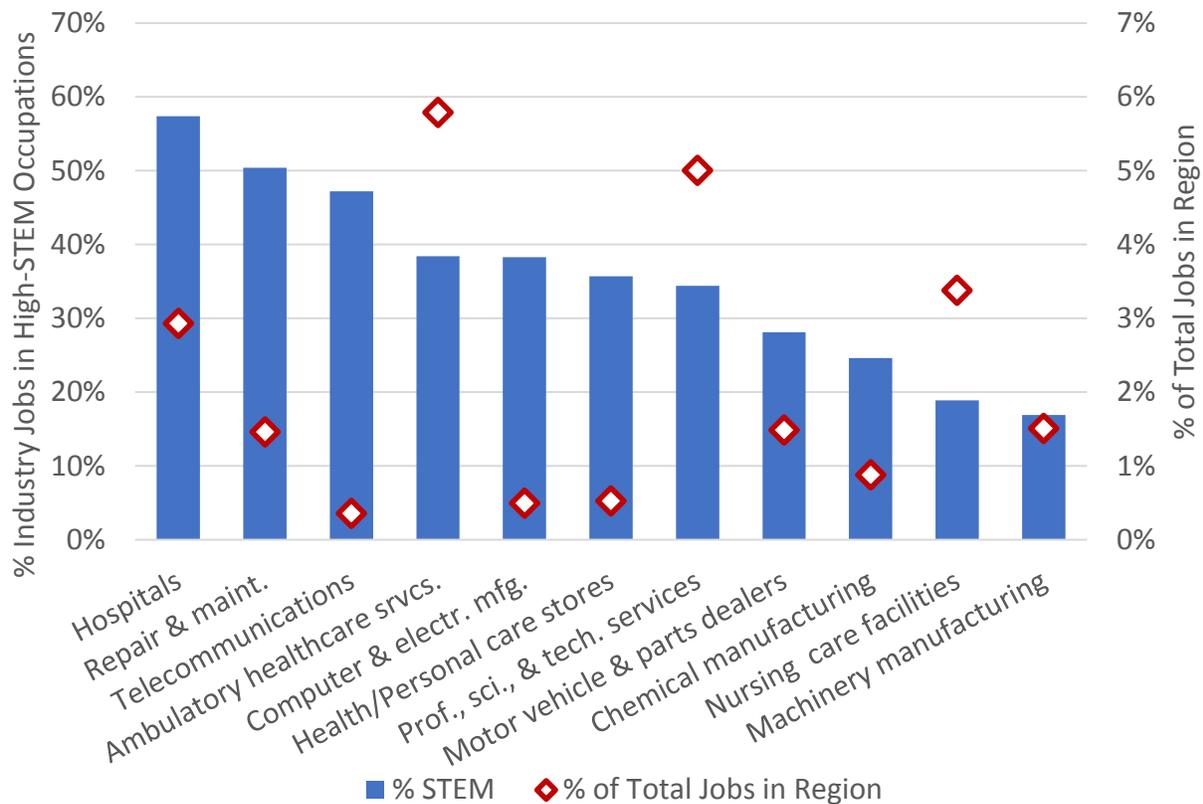
Occupation	Mean STEM Score	High-STEM % of Jobs
Architecture and engineering	10.6	100%
Life, physical, and social science	8.6	87%
Healthcare practitioner and technical	3.1	76%
Computer and mathematical science	2.9	100%
Installation, maintenance, and repair	2.6	53%

Source: “The Hidden STEM Economy.” Table 3, pg. 10. Brookings.

Healthcare practitioners account for the largest share of STEM jobs in the Lynchburg region (38%), followed by installation, maintenance, and repair jobs (29%). Across all sectors, 14 percent of jobs in the Lynchburg region are in occupations that have high requirements for STEM knowledge.

²² Jonathan Rothwell, “The Hidden STEM Economy,” Metropolitan Policy Program, Brookings, <https://www.brookings.edu/wp-content/uploads/2016/06/TheHiddenSTEMEconomy610.pdf>

Figure 7. STEM-intensity of select industries in the Lynchburg region



Source: EDR Group analysis using data from Brookings, Moody’s Analytics, and the U.S. Bureau of Labor Statistics.

SUMMARY

The regional economic base analysis points to a number of findings regarding the Lynchburg region’s economy:

- Lynchburg is the sixth-largest metro area in Virginia by population, and has experienced modest growth exceeded by places like Northern Virginia, Richmond, and Charlottesville (from 1998-2013).
- Recent employment growth in Lynchburg is slightly below average relative to metropolitan areas of similar size in the U.S.
- Economic forecasts predict that construction, certain business services, education, healthcare, and retail and wholesale will provide the majority of the region’s employment growth over the next decade while manufacturers continue to shed jobs. These industries depend on a mix of freight and passenger connectivity, as will be explored in the following chapter.
- While declining in employment, manufacturing remains a significant sector within Lynchburg’s regional economy, and a sector that has grown in overall production along with other local sectors.

This growth is enabled by productivity gains associated with new technology adoption and investments in human capital.

- The Lynchburg region is specialized in a number of clusters including: higher education, business services, nuclear energy, distribution/E-commerce, biopharmaceuticals, downstream chemicals, food manufacturing, and number of other manufacturing sectors. Clusters represent economic opportunities in that they tend to serve a broader market than the Lynchburg region alone and benefit from productivity gains associated with co-location.
- Manufacturing industries, including food, metal products, chemical, machinery, and paper manufacturing, help drive regional growth by producing more in the Lynchburg region than is locally demanded.
- STEM-education is important to the current and future economic wellbeing of the Lynchburg economy. Fourteen percent of all jobs in the Lynchburg region are in occupations that have high requirements for STEM knowledge. Healthcare practitioners account for the majority of these jobs, followed by installation, maintenance, and repair jobs. STEM-oriented metropolitan economies have been shown to perform better in the long-run and depend on a supply of educated workers, including those with some advanced STEM training but less than a four-year college degree.

3. CONNECTIVITY AND THE ECONOMY

Chapter 3 continues the baseline assessment, answering the question: How does connectivity support the regional economy? The chapter presents a data-driven assessment of multimodal passenger and freight transportation conditions in the region. It also examines broadband connectivity.

THE ROLE OF CONNECTIVITY

The transportation system connects people and firms with economic opportunities, forging connections at a both inter- and intra-regional scale. Within a regional economy, the multimodal passenger transportation system supports firms by providing access to workers, customers, and to collaborators at other firms. Inter-regional passenger transportation supports firms by providing access to visiting tourists who bring outside money into a local economy and by supporting business travel and recruitment efforts. In addition, inter-regional freight transportation provides firms and consumers with access to material goods, and enables the movement of goods to market. Looking beyond transportation, this chapter also considers the importance of digital connectivity in connecting businesses, workers, and customers in an increasingly technology-oriented economy.

Given the diversity of ways in which transportation supports economic activity, there are multiple approaches to quantifying the relationship between economic activity in the Lynchburg region and the connectivity provided by the transportation system, as discussed in the following sections. One approach to valuing the transportation system is to simply look at the spending by firms on transportation, as an input to production. On average, firms in the Lynchburg regional economy spend 1.1 percent of the total value of industry output (sales) on for-hire transportation, or \$203 million annually. This figure represents a conservative estimation of total firm spending on transportation as it does not include in-house transportation expenditures such as the cost of operating a firm’s own vehicle fleet for local deliveries. Some of Lynchburg’s major industries, such as food manufacturing and paper manufacturing, spend relatively more than the regional average on transportation, as shown Table 5.

Table 5 Relative spending on for-hire transportation

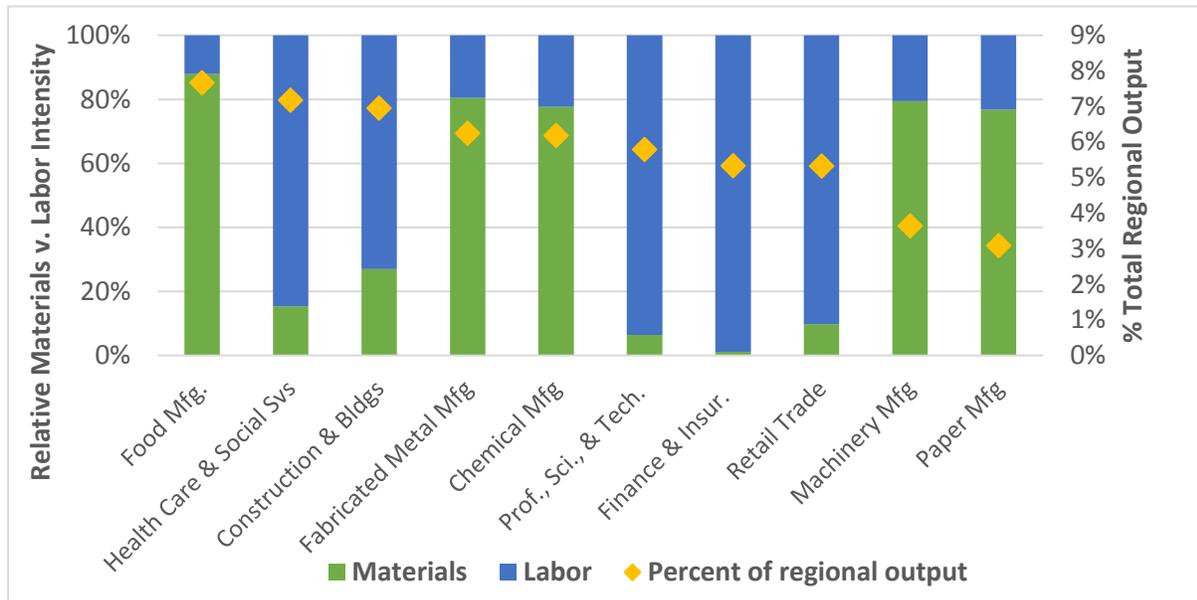
Industry	% of Industry Output
Food Manufacturing	2.40%
Construction & Bldgs	1.80%
Fabricated Metal Mfg	1.30%
Chemical Mfg	1.10%
Retail Trade	0.50%
Wholesale Trade	0.60%
Machinery Mfg	1.00%
Paper Mfg	3.90%
All Others	0.70%
Total	1.10%

Source: EDR Group analysis, data from the IMPLAN modelling system.

While instructive, spending on transportation provides only a partial picture of its importance. This perspective notably excludes expenditures by private citizens on travelling to and from work or other activities such as shopping or entertainment that result in economic flows in the economy.

Another approach to understanding the nature of business reliance on transportation connectivity is to examine the inputs on which businesses rely, and to then connect these inputs to the relevant components of the transportation system. All economic activity relies on a mix of material and labor inputs to produce an end-product. Some types of businesses rely more heavily on labor (e.g. service-sector industries), while others are particularly reliant on material inputs. Figure 8 shows the relative material and labor intensity of major industries in the Lynchburg regions. The green shaded bars represent the proportion of material inputs to production and the blue bars represents the portion of labor inputs. The yellow dots correspond to the right axis, showing the percentage of the region’s total business activity, as measured by gross business sales, of each industry in the regional economy. Industries are organized from left to right in descending size and are presented at the 3-digit NAICS level. For example, food manufacturing is shown to be particularly freight-intensive and accounts for approximately 8 percent of total regional economic output.

Figure 8 Relative material and labor intensity of major industries in the Lynchburg region



Source: EDR Group analysis, using data from IMPLAN and TREDIS fueled by Transearch.

The data show that Lynchburg’s economy is comprised of a mix of labor- and freight-intensive industries. Manufacturing relies heavily on the freight transportation system. The freight transportation system therefore supports the overall economy by enabling production in “traded industries” (i.e. those that trade with the outside world and bring money into the economy). Labor-intensive industries also rely on the transportation system, most notably for transport of workers from their place of residence to work.

Businesses additionally depend on inter-regional passenger connections to maintain relationships with collaborators and clients across longer distances, and as a tool for talent recruitment.

Given the need of businesses to access workers, customers, and inputs, all economic activity relies on the transportation system in some way—meaning that the entire value of a region’s economy could be described as “dependent” on transportation. However, not all regions or industry sectors use the transportation system in the same manner or the same intensity. By differentiating across sectors and modes, one can gain insight on the specific role of transportation in supporting the Lynchburg region.

LABOR MARKET ACCESS AND INTRA-REGIONAL CONNECTIVITY CONDITIONS

Lynchburg is more reliant on highway infrastructure for intra-regional passenger movements than is the state of Virginia as a whole. Figure 9 shows the mode split of commuters in the Lynchburg metropolitan area, as compared to the state of Virginia. Approximately 93 percent of commuters in Lynchburg drove alone or carpooled to work in 2014, compared to 88 percent in Virginia. Input from stakeholder interviews (see Chapter 4) and findings from the VMTP 2025 Needs Assessment²³ indicate that conditions on the road network are generally an advantage for the region, showing low levels of congestion with the exception of localized bottlenecks and relatively short average commutes. This is further confirmed by a comparison to peer regions. The Lynchburg region’s average commute time, 22.9 minutes, is within 20 percent of that in the benchmarking regions and below the national average of 25.7 minutes (Table 6).²⁴ Quality commutes are closely related to quality of life: a recent statewide survey of Virginia commuters found that shorter commutes are directly related to a person’s satisfaction with their trip to work.²⁵

The public transit mode share in the region is 1.4 percent. Transit access in the region is focused on the core Lynchburg area, with very minimal levels of access outside the City of Lynchburg. The recently published VMTP 2025 Needs Assessment for the region reports that “due to the lack of inter-city transit options in the region...commuters using transit are restricted in their ability to reach regional jobs.”²⁶ Public transit is relatively more important for regional residents who live below the poverty level, serving 5 percent of those living in poverty. In addition, certain industries are particularly dependent on workers who use transit to get to work: 40 percent of transit commuters work in either education or health care and social assistance, 12 percent are employed in retail, and another 11 percent work in the hospitality

²³ VTrans 2040. VMTP 2025 Needs Assessment - Central Virginia Region.

http://www.vtrans.org/resources/vmtp_oct2015/DRAFT_Central_Virginia_Region_Needs_Profile_9_30_15.pdf

²⁴ ACS 2014 5-year, U.S. Census.

²⁵ Southeastern Institute of Research. DRPT’s 2015 Virginia Statewide Travel Study: What It Means for Us and Our Elected Officials. As Presented by John W. Martin at VTA’s 2016 Annual Conference on May 24, 2016.

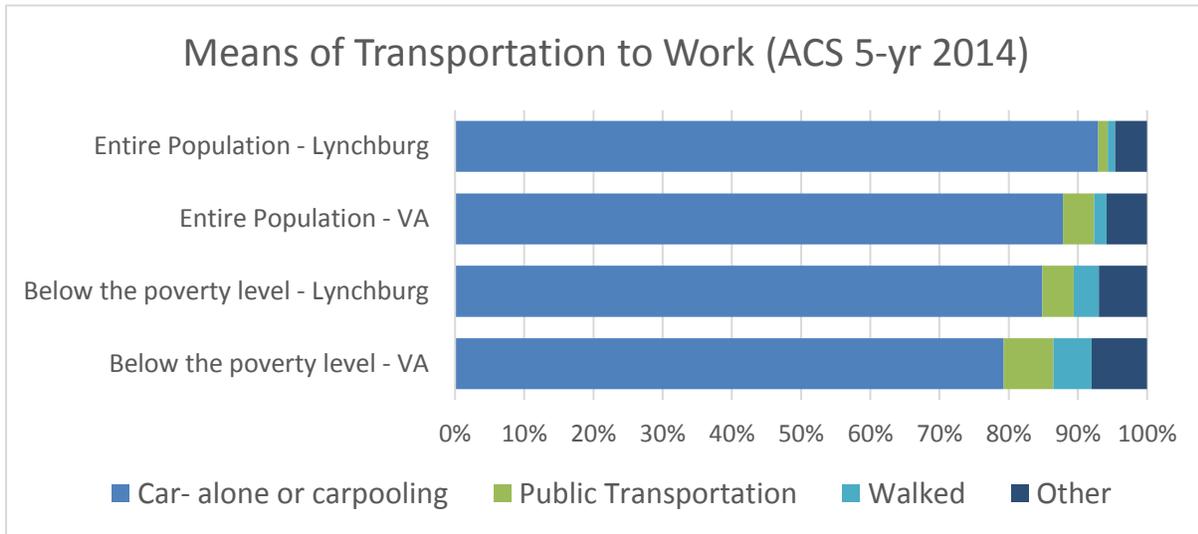
<http://www.drpt.virginia.gov/media/1854/2015-state-of-travel-study-highlights-as-presented-by-sir-at-vta-conference-05-24-16.pdf>

²⁶ VTrans 2040. VMTP 2025 Needs Assessment - Central Virginia Region.

http://www.vtrans.org/resources/vmtp_oct2015/DRAFT_Central_Virginia_Region_Needs_Profile_9_30_15.pdf

sector (e.g. arts, entertainment, and recreation, and accommodation and food services).²⁷ Not represented in these numbers is the role played by transit in supporting access to education for students in Lynchburg. Demonstrating the value placed on transit access, Liberty University provided \$1.0 million in service subsidies in 2014 to the Greater Lynchburg Transit Company (GLTC), which amounts to 11 percent of total GLTC operating expenses.²⁸

Figure 9 Commuting mode split, Lynchburg and Virginia



Source: American Community Survey. "Other" includes: taxicab, motorcycle, bicycle, and working at home.

Table 6 Peer comparison: labor market access and intra-regional connectivity

	Lynchburg	College Station	Merced	Wilmington
Young adult population growth (18-34), 1998-2013	-0.90%	1.50%	1.20%	0.90%
Mean travel time to work	22.9	18.9	26.3	21.9
Labor Market: 16+ Civilian Employed Population within 40-minute drive time	91,160	116,170	157,280	140,200

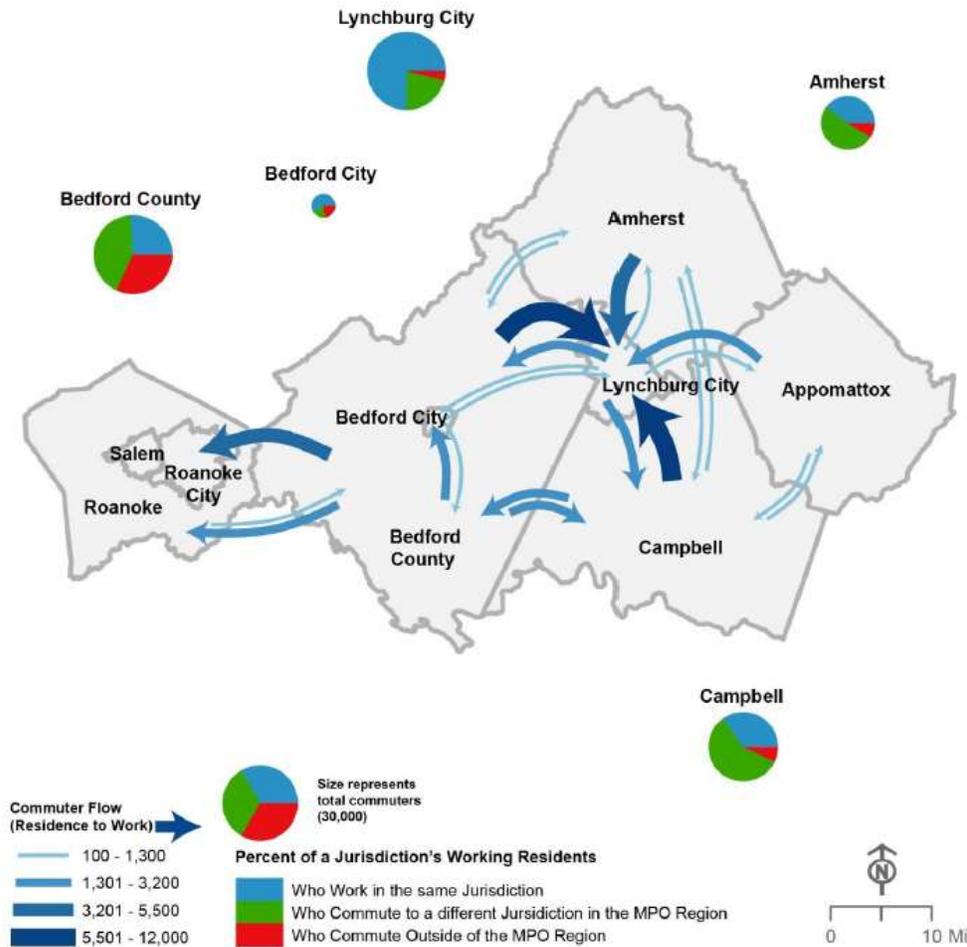
Source: Multiple. See Appendix 2 for details.

In terms of economic linkages created by commuting patterns, the region is strongly oriented towards the City of Lynchburg, but also has ties to Roanoke (Figure 10).

²⁷ American Community Survey, 2014 5-year estimate.

²⁸ GLTC. Annual Report 2014. <http://50.87.153.143/~glitconli/wp-content/uploads/2012/08/GLTC-Annual-webversion-1.pdf>

Figure 10 Regional Commuting Patterns



Source: VMTP Needs Assessment, using data from the US Census Longitudinal Employer-Household Dynamics (LEHD), 2006-2010.

Looking at the overall size of the labor market, the region does face challenges with respect to the size of the available workforce located within a reasonable 40-minute commute threshold, as shown in Table 6. Larger labor markets create productivity benefits through agglomeration economies as firms are better able to match job requirements to the available working population.²⁹ In the case of Lynchburg, there are parts of the region that are more than forty minutes from the urban core. Bedford is just inside this threshold and actually lies within the labor market area of nearby Roanoke. Lynchburg has also struggled

²⁹ NHCPR Report 786 Assessing Productivity Impacts of Transportation Investments. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_786.pdf

to attract and retain younger workers. From 1998-2013, the region's young adult population (18-34 years old) shrank by -0.9 percent (Table 6).³⁰ Among Lynchburg's peer regions of College Station, Merced, and Wilmington, this age cohort grew by 1.5 percent, 1.2 percent, and 0.9 percent, respectively. Educational attainment levels tell a similar story, possibly because Millennials are the most well-educated generation.³¹ In 2014, the share of the population over 25 with an associate's degree or higher was 32 percent in the Lynchburg region, compared with 39 percent in College Station, 20 percent in Merced, and 43 percent in Wilmington.³²

Lynchburg's ability to attract and retain talent is key to the region's future prosperity, and there are important transportation and land use factors that influence how desirable an area is to skilled workers. There is growing evidence that companies take transportation factors into consideration when choosing where to locate, in large part because they want to appeal to preferences of the younger workforce. In 2014, Smart Growth America interviewed representatives from over 40 companies that relocated, opened new offices, or expanded in "walkable downtowns" between 2010-2015.³³ The study found that companies choose locations with access to a range of transportation options, understanding and anticipating the importance employees place on having commute choices. A 2015 statewide travel study found that Millennials are more likely to walk, use the train, and use the bus for non-work trips than are other generations.³⁴

This trend is closely related to an emphasis among economic developers on the benefits derived from colleges, universities, and companies locating in close proximity to one another. Known as technology-led economic development the approach involves leveraging the resources of research universities to create "ecosystems" that foster entrepreneurship and experimentation. The Brookings Institution argues that the success of this new approach depends heavily on physical proximity and urban density. Some cities focus their efforts on single geographic areas referred to as innovation districts, although this is not necessarily prescribed.³⁵

INTER-REGIONAL PASSENGER CONNECTIVITY CONDITIONS

Intercity passenger transportation connectivity facilitates travel by outside visitors to the Lynchburg region for business, personal, and recreational purposes. These visitors support activity in the region by spending on hotels, transportation, food, and entertainment. According to estimates by the U.S. Travel Association developed for the Virginia Tourism Corporation, \$349 million in spending by domestic visitors

³⁰ U.S. Cluster Mapping Project

³¹ The Council of Economic Advisers, *15 Economic Facts About Millennials*, accessed September 20, 2016, https://www.whitehouse.gov/sites/default/files/docs/millennials_report.pdf.

³² American Community Survey.

³³ Smart Growth America. Core Values: Why American Companies Are Moving Downtown. <http://www.smartgrowthamerica.org/documents/core-values.pdf>

³⁴ Southeastern Institute of Research. DRPT's 2015 Virginia Statewide Travel Study: What It Means for Us and Our Elected Officials. As Presented by John W. Martin at VTA's 2016 Annual Conference on May 24, 2016.

³⁵ Brookings, Innovation Districts, <http://www.brookings.edu/about/programs/metro/innovation-districts>

to the Lynchburg region directly supported 3,564 jobs in 2014 (Table 7). This estimate does not include further multiplier effects associated with demand at suppliers and spending of worker income.³⁶ Inter-regional connections also facilitate outward business travel, as well as firm and employee recruitment efforts. Inter-regional passenger connections include access by personal vehicle, air, rail, and bus.

Table 7 Jobs Supported by Domestic Visitors to the Lynchburg Region

County	Jobs	Expenditures (\$M)
Amherst	276	23.5
Appomattox	102	10.0
Bedford*	1,124	98.0
Campbell	433	43.6
Lynchburg City	1,629	173.87
Total	3,564	348.9

Source: Prepared by the U.S. Travel Association for the Virginia Tourism Corporation.³⁷ (*Bedford City not broken out separately from Bedford County in the published data.)

The Lynchburg region benefits from generally good and reliable levels of service on its highway system. While the Lynchburg region does not have an interstate located within its geographic boundaries, this lack is a barrier less in actual mobility terms and more in how the region is viewed from outside. Employers report that perceived remoteness affects the ability to recruit new employees to the region. However, the region is still faced with the reality of physical remoteness from major centers of population and economic activity. Among the peer regions, Lynchburg lags both College Station and Merced in the size of its same-day regional travel market (Table 8). This measure captures the area that can be reasonably accessed with a one-day return trip by truck or by someone driving for business. Larger same-day travel markets unlock productivity gains from agglomeration economies, through a number of mechanisms including better matching between firms serving as both customers and suppliers, more cost effective management of supply chains and freight delivery, and increased potential for interaction and learning between firms. While Richmond, Greensboro, and Raleigh are inside the threshold for easy one-day drive times, Washington, DC, the Hampton Roads area, and Charlotte are more than three hours from Lynchburg’s core. This also points to the importance of other modes (air, rail) of intercity transportation in maintaining Lynchburg’s inter-regional connectivity.

Lynchburg’s Amtrak service is one of the region’s greatest connectivity assets, providing twice daily service to Washington, DC and the Northeast Corridor, via the Northeast Regional and Crescent Corridor Services. In 2015, Amtrak volumes in Lynchburg reached 84,045 arrivals and departures, an increase from 23,011 in 2009, the year the Virginia Department of Rail and Public Transportation (DRPT) began supporting regional intercity rail service as an extension of the Northeast Regional service. Forty-four percent of

³⁶ U.S. Travel Association. The Economic Impact of Domestic Travel on Virginia Counties 2014. <http://www.vatc.org/uploadedFiles/Research/2014EconomicImpactofDomesticTravelonVirginiaandLocalities.pdf>

³⁷ Data accessible at: <http://web.yesvirginia.org/localspending/localspending>

Lynchburg rail trips are between 100-199 miles in length, while an additional 37 percent of trips are between 300-399 miles. The top city pairs by ridership are Washington, DC (173 mi.) and New York, NY (398 mi.).³⁸ Lynchburg is served by two trains daily in each direction to/from Washington, DC, with a travel time between Lynchburg and Washington’s downtown Union Station of between 3.5 and 4 hours.

Table 8 Peer comparison: inter-regional connectivity

	Lynchburg	College Station	Merced*	Wilmington
Interstate				✓
Same-day travel market: Employment within three-hour drive time	3.7 M	7.1 M	6.2 M	2.4 M
Nonstop commercial airline destinations at regional airport	1	2	2	4
Enplanements at regional airport (2014)	78,876	91,127	2,018	378,203
Amtrak ridership growth, 2008-2014	244%	No Amtrak	34.50%	No Amtrak

Source: Multiple. See Appendix 2 for details. *Note: Merced is served by Boutique Air as part of the federally subsidized U.S. DOT Essential Air Service program.

Regional stakeholders view Amtrak service as an asset for its provision of easy access to Washington, DC. This access provides value to firms both by enabling easy business travel, and by enhancing the image of the region for young talent interested in proximity to major urban centers (see Chapter 4 for additional detail). In 2017, service will be extended through to Roanoke, and additional daily service will be added serving Lynchburg. Looking further into the future, North Carolina DOT recently recommended a study of the Lynchburg-Charlotte passenger rail corridor (currently serviced by the Crescent service), investigating the potential for a second daily train³⁹ and Virginia has highlighted connections to Richmond as a long-term corridor of interest.⁴⁰

Air connectivity in the Lynchburg region is provided most directly by Lynchburg Regional Airport (LYH). As of calendar year 2014, Lynchburg Regional supported 78,876 passenger enplanements (boardings), a 1.4 percent increase over the previous year. For comparison, Roanoke Regional Airport and Charlottesville-Abermarle supported 305,496 and 250,666 enplanements, respectively.⁴¹ The airport is served by one airline, American, and provides six daily arrivals and departures to/from a single connecting hub airport:

³⁸ National Association of Railroad Passengers. Ridership Statistics by City.

http://www.narprail.org/site/assets/files/1038/cities_2015.pdf

³⁹ NCDOT Rail Division. Comprehensive State Rail Plan. August 2015.

<https://connect.ncdot.gov/resources/RailPoliciesDocument/2015%20Comprehensive%20State%20Rail%20Plan-%20Full%20Report.pdf>

⁴⁰ DRPT. 2013 Virginia Statewide Rail Plan. US 29, US 460, and I-81 Passenger Service (pg. 5-13).

<http://www.drpt.virginia.gov/media/1135/vsrp-2013.pdf>

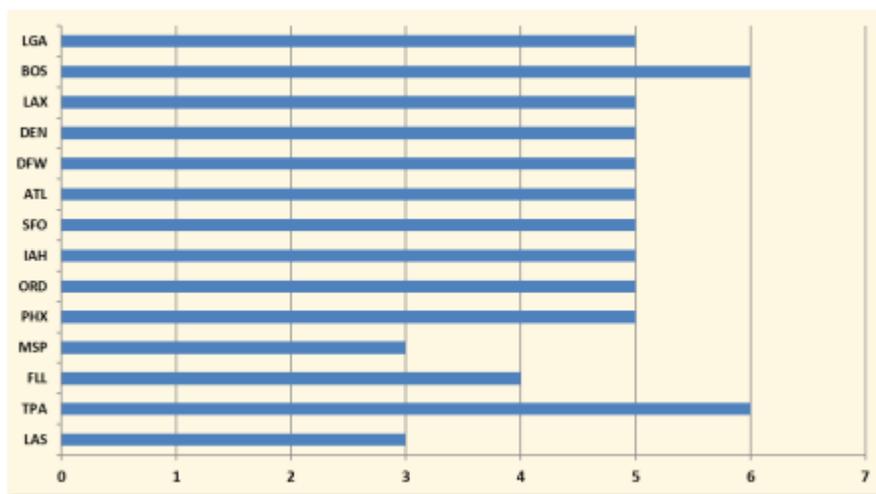
⁴¹ FAA. CY 2014 Passenger Boarding.

http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/

Charlotte. Despite being Lynchburg’s only nonstop connection, Charlotte offers considerable value on the connectivity front: Charlotte is one of American Airlines’ most profitable hubs, is not currently subject to congestion, and has experienced recent growth in service.⁴² Because of the number of flights out of Charlotte and the six flights per day from Lynchburg, Lynchburg travelers achieve a high rate of connection within 90 minutes to top destinations (Figure 11).

Of the peer regions, traffic at Lynchburg is closest to the levels achieved at Easterwood Airport, which serves College Station, TX. Wilmington, Lynchburg’s similarly-sized peer on the East Coast, is served by an airport with over five times the number of passengers annually than Lynchburg. This significant difference stems most notably from Wilmington’s status as a “destination market” that attracts travelers from outside the region, while Lynchburg is primarily an “origin” market where demand is tied to the local population and business base. Lynchburg lags the peer regions in the number of destinations that can be accessed through non-stop air connections, but performs relatively similarly with respect to price competitiveness (Table 9). Relative to nearby Roanoke, Lynchburg Regional Airport offers competitive fares that were approximately 25.4 percent lower on average from July 2008 to June 2016.⁴³

Figure 11 Number of daily LYH departing flights that connect to destinations within 90 minutes at Charlotte



Source: Mark Courtney, LYH Airport Director.

⁴² Mark Courtney, LYH Airport Director.

⁴³ Amadeus/Focalpoint published fares, provided by Mark Courtney, LYH Airport Director.

Table 9. Airport Statistics for 12-Month Period ending June 2016 (k = 1,000s)

	Lynchburg Regional Airport (LYH)	College Station/Bryan Easterwood Field (CLL)	Merced Regional Airport (MCE)	Wilmington International Airport (ILM)
Passengers – arrival (national rank)	76 k (240)	75 k (241)	4,844 (#420)	397 k (#129)
Passengers – departure (national rank)	76 k (241)	79 k (238)	5,027 (#415)	401 k (#129)
Scheduled flight departures (national rank)	1,944 (309)	2,652 (257)	967 (#452)	6,921 (#145)
Top non-stop destinations (passengers)	Charlotte (76 k)	Dallas/Fort Worth (58 k) Houston (21 k)	Los Angeles (2,970) Oakland (1,450) *Las Vegas (540)	Charlotte (218 k) Atlanta (110 k) Philadelphia (44 k) New York (25 k) **Washington, DC (2 k)
Average fare by Origin City in 2015 (2015 dollars)	\$508	\$481	\$448	\$472

*Service to Las Vegas no longer operated. **Service offered on weekends, only.

Source: <http://www.transtats.bts.gov/airports.asp?pn=1>; <http://www.transtats.bts.gov/AverageFare/> for average fares

Lynchburg Regional Airport faces many of the same challenges as other smaller non-hub airports across the United States. It is subject to trends in the commercial air service industry towards airline consolidation and consolidation of service towards larger airports and larger planes (as older smaller equipment is retired). Some airlines are also reporting an emerging pilot shortage, affecting regional carriers first. Piedmont airlines, one of Lynchburg’s carriers that operates as a codeshare with American Airlines, has expressed concerns about the pilot shortage’s effects on its ability to maintain levels of service system-wide. In addition, commercial aviation has also been operating in recent years in a new regime of capacity discipline, rather than expansion. Following the shocks of the economic crisis and high fuel prices, airlines are much more risk averse than they once were when it comes to expanding service. As is also common to smaller airports, Lynchburg Regional competes with other airports located some driving distance away, including Roanoke, Richmond, Raleigh-Durham, and Dulles Airport in the DC area. The closest international service airports to the Lynchburg region are Raleigh-Durham, Dulles, and Charlotte—locate approximately 2.5, 3.25, and 3.5 hours from the center of the region, respectively. Finally, the airport has faced reliability issues that stem largely from maintenance for older turboprop equipment (Dash 8-300s), and to a lesser extent from crew availability. While the airport still performs similarly relative to Roanoke and Charlottesville (Figure 12), the perception of poor reliability can lead to increased leakage of traffic to other airports, which in the long-run risks degrading level of service provided by American. According to the airport director, Both Piedmont Airlines and American airlines are taking steps to address reliability. Piedmont has announced a more aggressive maintenance program and American Airlines has added a new regional jet service to Lynchburg, using a newer airplane (CRJ-700) and operated by PSA, another regional airline facing less severe pilot shortage conditions.⁴⁴

⁴⁴ Mark Courtney, LYH Airport Director.

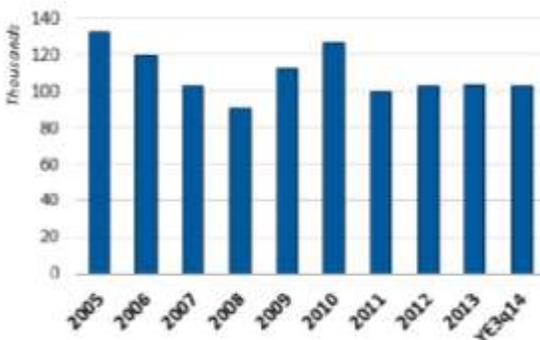
Figure 12 June 2016 on-time performance statistics



Source: Mark Courtney, LYH Airport Director.

Despite these challenges, the airport has demonstrated success as a regional air market. A recently published study by the Virginia Department of Aviation (DOAV) found that Lynchburg maintained a relatively constant level of capacity while other regional airports contracted (Figure 13), has achieved gains in aircraft size, revenue per seat, and load factors from 2004 to 2014, and outperforms peers on revenue per seat and average load factor.⁴⁵ This trend continues with the recent reintroduction of regional jet service. On the other hand, the same DOAV report found that the Lynchburg region is outperformed by peer airport market areas in terms of variables related to air service demand (GDP, income per capita, and propensity to travel).

Figure 13 Total Departing Seats at LYH, 2005-Year Ended 3Q 2014



Source: DOAV. Virginia Commercial Air Service Strategic Review. December 2015.

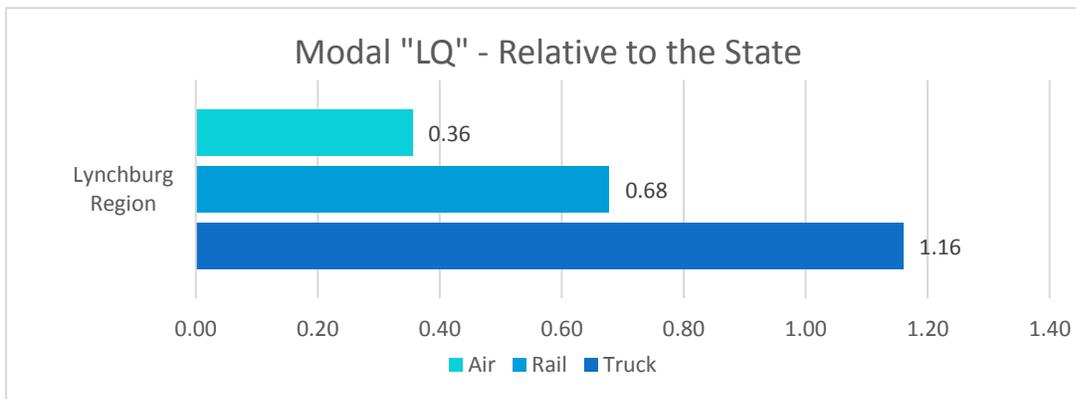
⁴⁵ DOAV. Virginia Commercial Air Service Strategic Review. December 2015. <http://www.doav.virginia.gov/Downloads/Studies/Strategic%20Review%202015/DOAV%20Strategic%20Review%20Final%20December%202015%20Reduced3.pdf>

All told, air service connectivity is a two-sided story for Lynchburg. On the one hand, the airport is an asset that generates regional economic activity and offers advantages in terms of easy access/egress and the quality of the facilities provided. A 2011 study conducted for the Virginia Department of Aviation estimated that Lynchburg Regional airport supports 522 jobs in the state economy by enabling the arrival of visitors and supporting their expenditures on lodging, entertainment, ground transportation, and various consumer goods.⁴⁶ On the other hand, air service is consistently cited by members of the community as a connectivity limitation, and therefore the topic of additional air commercial service is always a topic of intense interest. Additional stakeholder perspectives on this matter are discussed in Chapter 4. Chapter 6 addresses specific actions available to the region to work towards maintaining, enhancing, and expanding air connectivity.

INTER-REGIONAL FREIGHT CONNECTIVITY CONDITIONS

When it comes to freight transportation, Lynchburg also relies more heavily on the road network than on other modes (rail, air). Figure 14 presents “location quotients” that compare the relative reliance of the Lynchburg region on different freight modes to reliance in Virginia as a whole. A location quotient of one would mean that the reliance of Lynchburg industries on a given mode is about the same as the rest of the state. A value below one indicates less reliance and above one indicates more reliance. The Lynchburg region is less reliant on air and rail than the Commonwealth overall, but approximately 1.2 times *more* dependent on truck movements.

Figure 14 Lynchburg freight dependence, relative to Virginia freight dependence, by mode



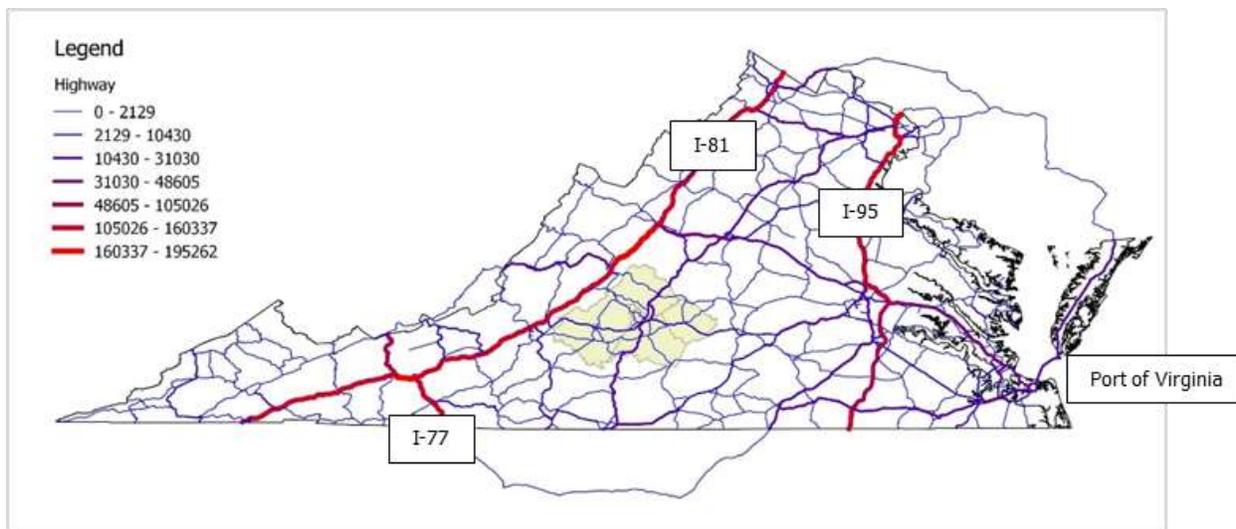
Source: VMTP Needs Assessment.⁴⁷ Location quotients calculated on the basis of freight-dependent industry output, as developed from TREDIS fueled by Transearch.

⁴⁶ Includes 370 directly supported by visitor expenditures and an additional 153 jobs associated with indirect and induced effects. Report available at: <http://www.doav.virginia.gov/Downloads/Studies/Economic%20Impact%20Study%202011/Compliant/VA%20Air%20Trans%20Economic%20Impact%20Study%20Final%20Technical%20Report%2008-09-11.pdf>

⁴⁷ Does not include Appomattox County.

The Lynchburg economy relies on the Virginia highway system to access material inputs and move goods to market, including infrastructure located both inside and outside the Lynchburg region. Similarly, other regions rely on infrastructure within Lynchburg in that goods produced and consumed by other regions are transported through Lynchburg. Figure 15 shows the total value of commodities moved on the highway network in Virginia. As expected, the interstate system are the most heavily traveled corridors by value. Figure 16 drills down further to examine the highway corridors used by goods originating in or destined for the Lynchburg region (excluding through-flows). This analysis highlights a different set of corridors that are particularly important to the Lynchburg economy, namely: US 29 for north-south connections, US 460 which provides access east towards the Port of Virginia and west to I-81, and US 501 which provides westward connectivity to I-81 and I-64.⁴⁸

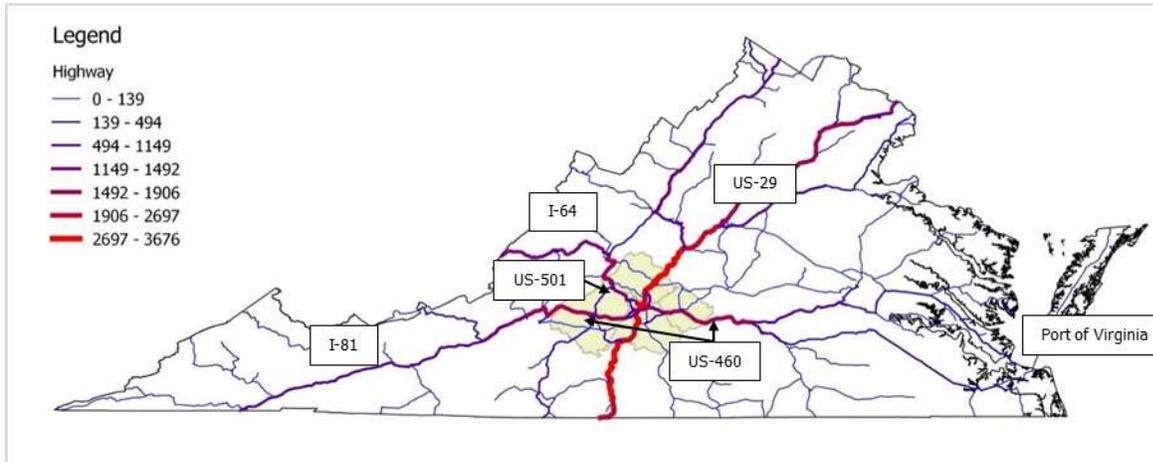
Figure 15 Total value of goods moved on the highway network (2012, \$M)



Source: EDR Group analysis, using Transearch data.

⁴⁸ Note: US 221 is also an important corridor within the Lynchburg region; however, the statewide Transearch data set at present does not have adequate detail to represent these flows on the network.

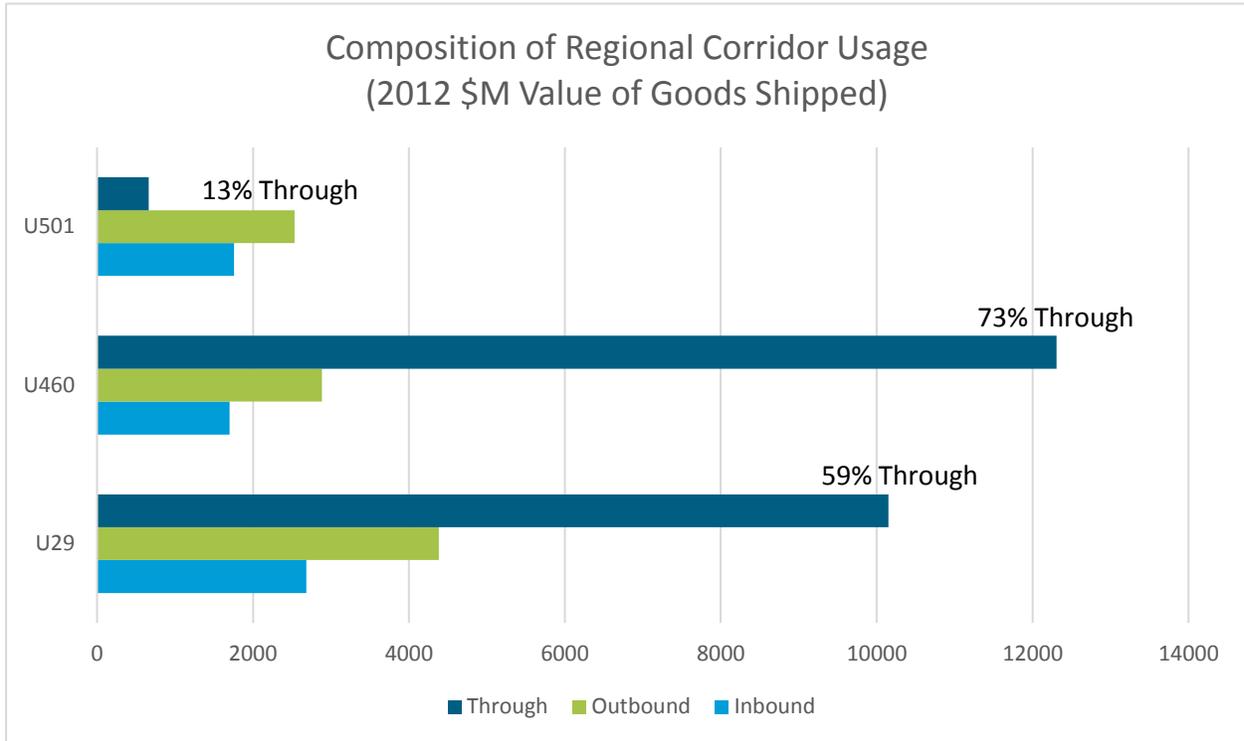
Figure 16 Value of goods moved on the highway network associated with Lynchburg region (2012, \$M)



Source: EDR Group analysis, using Transearch data.

Overall, the major highway corridors in the Lynchburg region demonstrate a mix of regional and state significance. Figure 17 shows the relative balance of inbound, outbound, and through flows on US 501, US 29, and US 460. US 460, a Corridor of State Significance (E, the Heartland Corridor), carries significant value originating and destined for Lynchburg but also has a high percentage of through flows that do not stop in Lynchburg or directly affect the Lynchburg economy. Similarly, US 29 is a key corridor for Lynchburg freight flows, but also carries a large amount of through traffic associated with businesses located outside the region. This is consistent with its designation as a Corridor of State Significance (I, the Seminole Corridor). US 501, on the other hand, has a comparatively small share of through-flows, but is very important to the Lynchburg economy.

Figure 17 Lynchburg highway corridors, composition of directional flows



Source: EDR Group analysis, using Transearch data.

The role of the freight transportation system can be further elucidated by examining the relationship between the profile of commodities carried on particular corridors and the types of industries that produce or consume these commodities. Figure 18 presents the portion of regional output within different industries that is reliant on commodities moved on US 29, US460, and US501. The distribution shows that major industries in the region tend to rely in similar proportions on all three of these corridors, meaning that a broad cross-section of the region’s economy depends on maintaining performance on each of these three corridors.

Figure 18 Freight Dependent Output on Key Corridors, by Industry (2012)

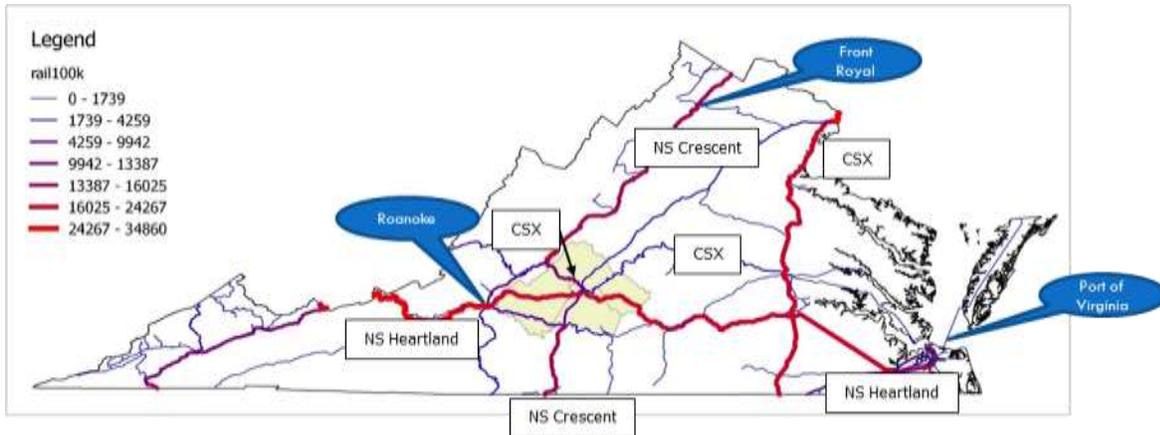
Industry	Dependent Output (\$M)		
	US 29	US 460	US 501
Food Manufacturing	\$824	\$370	\$435
Fabricated Metal Mfg	\$553	\$222	\$304
Chemical Mfg	\$385	\$200	\$267
Machinery Mfg	\$344	\$159	\$181
Construction & Bldgs	\$264	\$163	\$178
Paper Mfg	\$172	\$92	\$93
Plastics & Rubber Products Mfg	\$135	\$48	\$58
Computer and Electronic Mfg	\$87	\$37	\$46
Health Care and Social Assistance	\$87	\$41	\$59
Electrical Equipment & Appliance Mfg	\$74	\$25	\$41
Printing	\$59	\$37	\$34
Transporation Equipment Mfg	\$63	\$27	\$42

Source: EDR Group analysis, using TREDIS fueled by Transearch.

Rail freight is most economically efficient for long-haul movements. The Lynchburg region is crossed by a number of Class I railroads, including the double-stacked Norfolk Southern Heartland and Crescent intermodal corridors. Intermodal rail refers to specialized freight rail services that move as either trailer-on-flatcar or container-on-flatcar (TOFC/COFC) services and enable smooth integration with other modes (e.g. marine, truck). In general, the rail network in Virginia carries a combination of containerized and bulk cargos. Figure 19 depicts total commodity value moving on the rail network in Virginia.

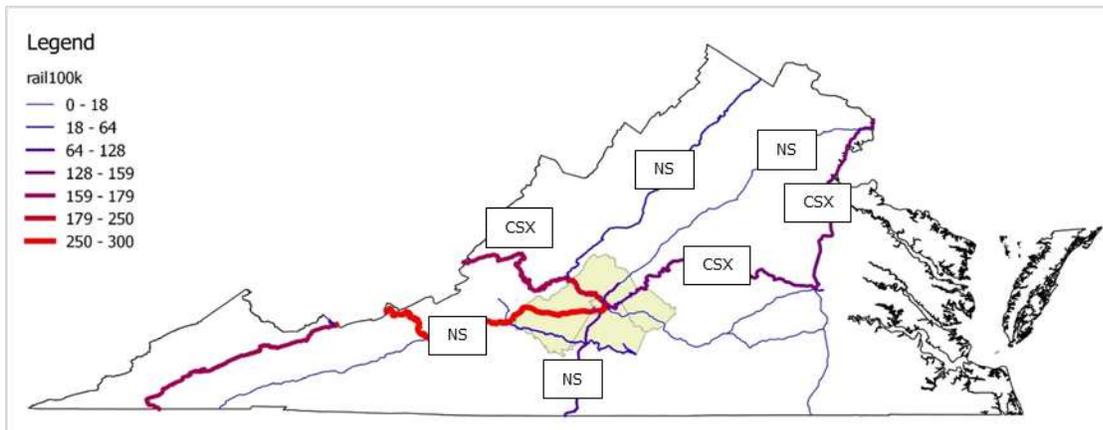
While containerized rail cargo passes through Lynchburg, the Lynchburg region does not have an intermodal container rail transfer terminal and all rail cargoes loaded and unloaded in the region are in the form of rail carload traffic, primarily bulk commodities. Figure 20 shows the value of rail freight movements by corridor for any cargoes originating in or destined for the Lynchburg region. Connections to the Port of Virginia by rail do not show up on this second map because of the nature of rail service and the distance between Lynchburg and the Hampton Roads area: Lynchburg is located less than 200 miles from the port, a distance at which it is more economically efficient to transport goods by truck. Lynchburg is within the market area of five existing intermodal container rail terminals and the Port of Virginia—generally defined by a 250-mile radius rule-of-thumb (Figure 21). Also located nearby in Roanoke is a Norfolk Southern “Thoroughbred Bulk Transfer Terminal” that provides rail-to-truck and truck-to-rail bulk transfer and distribution services.

Figure 19 Total value on the rail network (2012, \$M)



Source: EDR Group analysis, using Transearch data.

Figure 20 Value on the rail network associated with Lynchburg region (2012, \$M)



Source: EDR Group analysis, using Transearch data.

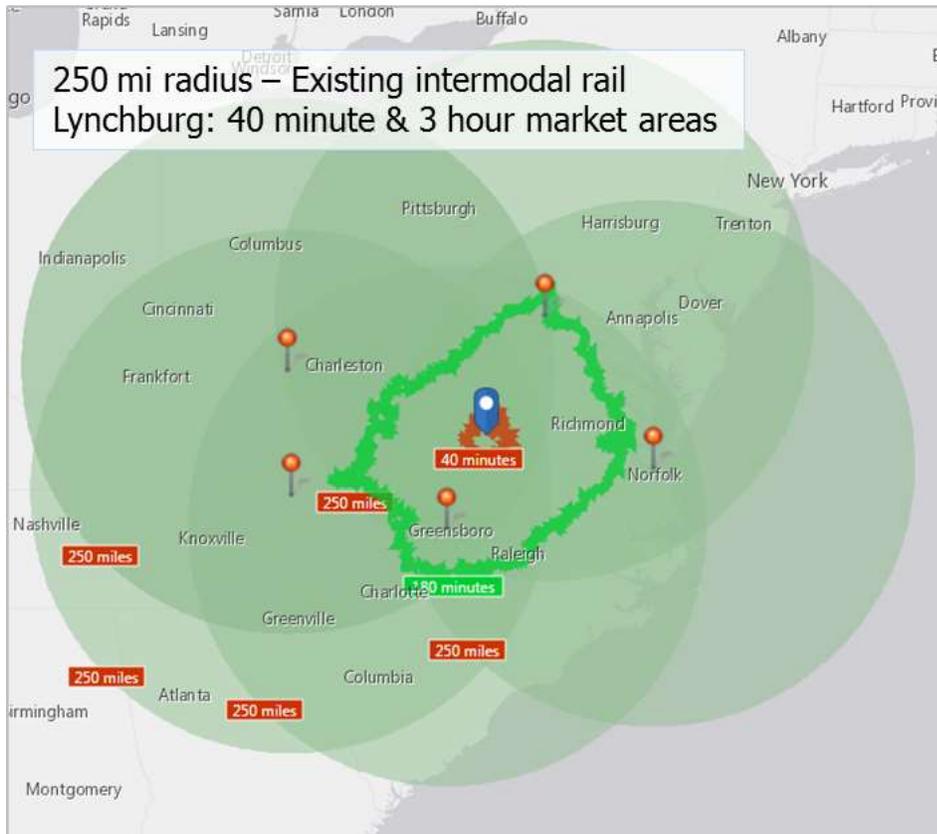
In contrast to the highway freight network which serves many different industry sectors, freight rail has a more specialized role within the Lynchburg economy. Rail in Lynchburg carries commodities such as plastic, paper, industrial chemicals, steel, waste and scrap materials, grain, and wood products. These commodities are associated with production by a number of the more traditional heavy manufacturing sectors, as shown in Table 10. For example, Georgia Pacific Big Island is served by a CSX rail spur. According to the Transearch data set, 55 percent of all inbound rail freight (by value) to the Lynchburg region originates in Illinois, Louisiana, and Maine while 64 percent of all outbound rail freight is destined for locations in North Carolina, Pennsylvania, and New Jersey. The average rail carload trip length originating in or destined for Lynchburg is 550 miles.

Table 10 Rail-dependent industry output in the Lynchburg region (2012, \$M)

Industry	Dependent Output (\$)
Plastics & Rubber Products Mfg	\$170
Paper Mfg	\$97
Textile Mills & Products Mfg	\$65
Fabricated Metal Mfg	\$62
Chemical Mfg	\$60
Printing	\$27
Food Manufacturing	\$25
Primary Metal Mfg	\$14
Machinery Mfg	\$13

Source: EDR Group analysis, using TREDIS fueled by Transearch.

Figure 21 Lynchburg and existing intermodal container rail terminals



Source: EDR Group analysis using ESRI Business Analyst Online.

The peer regions of College Station and Merced outperform Lynchburg with respect to access to intermodal rail terminals and major marine ports (Table 11).⁴⁹ Carriers leaving College Station can reach the nearest intermodal terminal in under two hours and the nearest port in just over two hours (both in Houston). Carriers leaving Merced can reach the nearest intermodal terminal (Stockton) in just over one hour and the nearest port (Oakland) in just over two hours. Comparatively, drive times from Lynchburg to the intermodal terminal in Greensboro, NC, and port in Hampton Roads are 2:10 and 3:40, respectively. Additionally, as mentioned previously, Lynchburg lags both College Station and Merced in the size of its same-day regional travel market, meaning that freight-oriented businesses have a more limited base of economic activity that can be accessed by truck with a single-day return trip.

Table 11 Peer comparison: inter-regional connectivity

	Lynchburg	College Station	Merced*	Wilmington
Interstate				✓
Same-day deliver market: Employment within three-hour drive time	3.7 M	7.1 M	6.2 M	2.4 M
Drive time to closest intermodal rail terminal	2:10	1:45	1:10	3:15
Drive time to nearest major marine port	3:40	2:05	2:05	3:30
Drive time to closest intermodal rail terminal	2:10	1:45	1:10	3:15

Source: Multiple. See Appendix 2 for details.

DIGITAL CONNECTIVITY

In an increasingly networked economy, broadband connectivity is important to the business community, contributing to increased productivity, competitiveness, and efficiency.⁵⁰ Specific business functions that rely on high-speed Internet include marketing, data management, supply chain management, and cloud computing. At a regional level, telecommunications infrastructure can help attract businesses and foster entrepreneurship, in turn creating jobs and generating tax revenue. There is evidence that broadband connectivity benefits urban areas more than rural areas, and some industries more than others.⁵¹

Figure 22 shows download speeds across the Lynchburg MSA. The Federal Communications Commission uses a benchmark of 25 megabytes per second (mbps) to measure broadband deployment, meaning that the majority of the City of Lynchburg and portions of the outlying counties have relatively high download

⁴⁹ Google Maps and the Intermodal Association of North America.

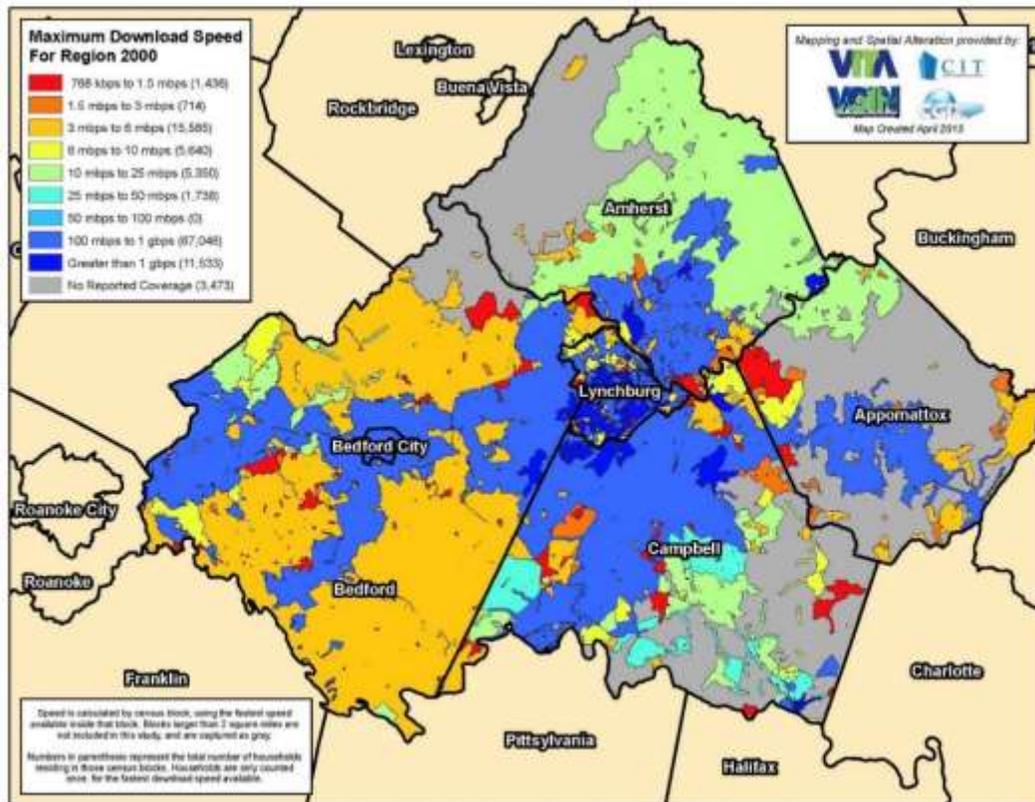
⁵⁰ Appalachian Regional Commission, 2015, *Program Evaluation of the Appalachian Regional Commission's Telecommunications and Technology Projects: FY2004-FY2010*.

⁵¹ What works centre for local economic growth. Evidence Review: Broadband. March 2015.

http://www.whatworksgrowth.org/public/files/Policy_Reviews/15-03-10-Broadband-Summary.pdf

speeds.⁵² All but a small portion of Bedford County has Internet service, while large portions of Amherst, Appomattox, and Campbell counties have no reported coverage.

Figure 22. Download Speeds in the Lynchburg Region



Source: Lynchburg Regional Technology Council.⁵³

The Lynchburg Region’s Technology Council hosted a broadband summit in 2015, developing a vision for improved connectivity.⁵⁴ Discussions focused on approaches to assessing demand and expanding services in an efficient, strategic way.⁵⁵ One way to do so is through expanding the use of fiber optic cable, a broadband technology that transmits data many times faster than DSL (transmitted via telephone lines) and cable modems (coaxial TV cables). Much has been written about Chattanooga, Tennessee, and the

⁵² FCC, 2016 Broadband Progress Report, <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2016-broadband-progress-report>

⁵³ Downloaded from: <http://www.techcouncil.us/wp-content/uploads/2015/06/Region2000reducedsize.jpg>

⁵⁴ Lynchburg Regional Technology Council, 2015 Region 2000 Broadband Summit, <http://www.techcouncil.us/events/2015-region-2000-broadband-summit/>

⁵⁵ Center for Innovative Technology, Strategic Broadband Roadmap, <http://www.techcouncil.us/wp-content/uploads/2015/06/broadband-infographic.pdf>

investment its city-owned electric utility made in a fiber optic network that transfers data at 1 gigabit per second—a speed that is 50 times the U.S. average.⁵⁶ Other cities have taken similar steps, and the Obama Administration actively supports community-based broadband as a way to increase competition and provide consumers with more choice.⁵⁷ Lynchburg has an existing fiber optic network, owned by Lumos Networks, a private entity (Figure 23). Customers include the City of Lynchburg and Liberty University.⁵⁸ While fiber optic bandwidth is mentioned on the Opportunity Lynchburg website,⁵⁹ it is unclear the degree to which local leaders market the service as an economic development asset. In Virginia, municipalities are generally prohibited from providing Internet broadband services themselves. However, there are a variety of alternate legal structures that communities can use to improve broadband coverage. These include Broadband Authorities that are formed by local governments and can themselves operate as service providers.⁶⁰ Additional approaches are discussed in Chapter 6.

Figure 23. Fiber Optic Network in the Lynchburg Region



Source: Lumos Networks.⁶¹

⁵⁶ Edward Wyatt, “Fast Internet Is Chattanooga’s New Locomotive,” NY Times, <http://www.nytimes.com/2014/02/04/technology/fast-internet-service-speeds-business-development-in-chattanooga.html>

⁵⁷ The Executive Office of the President, Community-Based Broadband Solutions, https://www.whitehouse.gov/sites/default/files/docs/community-based_broadband_report_by_executive_office_of_the_president.pdf

⁵⁸ Lumos Networks, “City of Lynchburg,” <https://www.lumosnetworks.com/business/customer-solutions/lynchburg>, and “Liberty University,” <https://www.lumosnetworks.com/business/customer-solutions/liberty-university>

⁵⁹ <http://www.opportunitylynchburg.com/>

⁶⁰ Jeffrey S. Gore, Jeffrey S. Gore, 2008, for the Virginia Association of Counties, “Wireless Service Authorities and the Virginia Wireless Service Authority Act,” <http://www.vaco.org/AnnualConferenceFiles/08ACFiles/Wireless%20Authority%20FAQs%20jsg%202008%20Jeff%20Gore.pdf>

⁶¹ <https://www.lumosnetworks.com/business/fiber-maps>

SUMMARY

The following summary observations draw on the discussion above to describe the relationship between transportation and digital connectivity and the Lynchburg regional economy:

- Lynchburg's economy is comprised of a mix of labor- and freight-intensive industries. Manufacturing, a key traded industry sector, relies heavily on the freight transportation system. Labor-intensive industries also rely on the transportation system, most notably for access to labor.
- With regard to intra-regional connectivity, conditions on the road network are an advantage for the region, demonstrating reliability, relatively short average commutes, and low levels of congestion with the exception of localized bottlenecks. Transit access is much more limited. Existing transit access is particularly important to low-income residents, the health care, retail, and hospitality sectors, and for providing students with access to higher education. Relative to its peers, the region is constrained by the size of its labor market and has struggled to retain a young adult population. Looking forward, providing additional transportation options can be one part of a broader agenda aimed at attracting and retaining a young educated workforce.
- Intercity passenger transportation connectivity facilitates travel by outside visitors to the Lynchburg region, outward business travel, and firm and employee recruitment efforts. Conditions on the highway system are generally good but the region does not have direct access to an interstate, a factor that contributes to a perception of remoteness despite the quality of other highway connections. In addition, Lynchburg is constrained in the size of its same-day regional travel market.
- Lynchburg's Amtrak service is one of the region's greatest connectivity assets. Passenger rail access provides value to firms both by enabling easy business travel, and by enhancing the image of the region for young talent interested in proximity to major urban centers. As additional service is added, Amtrak will continue to build connectivity between Lynchburg and other centers of commerce, particularly in the Northeast.
- Air service is sometimes cited by members of the community as a connectivity limitation, affecting the image of the region and the ability to recruit people and firms. Nevertheless, the airport is an asset, offering advantages in terms of easy access/egress and the quality of the facilities provided, and has successfully managed to maintain and enhance commercial service over a period of significant consolidation in the airline industry as a whole. The value of maintaining commercial air service should not be understated.
- When it comes to freight transportation, Lynchburg also relies more heavily on the road network than on other modes (rail, air). The freight transportation system can be characterized by a significant degree of inter-regional dependence: The Lynchburg economy depends on infrastructure located both inside and outside the region. Similarly, other regions rely on infrastructure within Lynchburg in that goods produced and consumed by other regions are transported through Lynchburg.
- The following inter-regional highway corridors are particularly important to the Lynchburg economy: US 29 for north-south connections, US 460 which provides access east towards the Port of Virginia and west to I-81, and US 501 which provides westward connectivity to I-81 and I-64. Major industries in the region tend to rely in similar proportions on all three corridors, meaning that

a broad cross-section of the region's economy depends on maintaining performance on these routes.

- The Lynchburg region is crossed by a number of Class I railroads. Although containerized rail cargo passes through Lynchburg, the Lynchburg region does not have an intermodal container rail transfer terminal and all rail cargoes loaded and unloaded in the region are in the form of rail carload traffic, primarily bulk commodities associated with more traditional heavy manufacturing sectors. Lynchburg is within the market area of existing intermodal container rail terminals and the Port of Virginia—generally defined by a 250-mile radius rule-of-thumb—and is thus not a likely candidate for a new intermodal facility. There may, however, be other opportunities for rail-oriented development that would take advantage of the significant freight rail capacity in the region (e.g. individual industrial users or logistics and warehousing operations that facilitate truck-rail transfers for other businesses).
- Broadband connectivity is critical to businesses and entrepreneurs operating in today's economy, yet large portions of the counties surrounding the City of Lynchburg have either no reported broadband coverage or download speeds below an official benchmark set by the Federal Communications Commission. On the other hand, Lynchburg and surrounding towns are served by a high-speed fiber optic network. This service has the potential to be further capitalized upon as an economic development asset.

4. REGIONAL STAKEHOLDER PERSPECTIVES

INTERVIEW METHODOLOGY

The stakeholder interview process was designed to meet the following objectives:

- 1) Establish key factors for business success in the region including both physical and social infrastructure;
- 2) Establish the strategic role of the region's multimodal transportation system in supporting businesses through access to customer markets, suppliers, and labor force; and
- 3) Identify current constraints and the implications for businesses in terms of operational strategies, costs, and other consequences.

To this end, three sets of interviewees were identified: regional experts with broad knowledge of regional competitiveness and trends, major transportation service providers with a unique supply-side perspective on transportation conditions affecting the region, and business representatives able to offer industry-specific views on connectivity within the Lynchburg region.

The business representatives were selected to provide representation across different types of industries in the Lynchburg economy including the nuclear energy sector, advanced manufacturing, retail and wholesale, health care, transportation services, and heavy industry. These sectors were selected based both on their importance to the regional economy, and on the expected complexity of their transportation requirements for goods movement, access to workers, and business travel.

REGIONAL EXPERT PERSPECTIVES

The consultant team conducted interviews with the following regional experts:

- Megan Lucas, Lynchburg Regional Business Alliance
- Marjette Upshur, Lynchburg Office of Economic Development
- Ben Bowman, Region 2000 Workforce Development Board
- Sergei Troubetzkoy, City of Lynchburg Tourism Director, and
- J. Philip Gottwals (ACDS, LLC), an agricultural consultant with knowledge and experience in the region.

Findings of these interviews are organized below according to a number of common themes.

The region is central but lacking in inter-regional connectivity.

According to Sergei Troubetzkoy, Lynchburg is the largest city in the U.S. not served by an Interstate. Lynchburg faces the contradiction of being centrally located in Virginia with relatively low levels of roadway congestion, but isolated because of a lack of interstate access. According to Megan Lucas, transportation overall is not often mentioned as an issue by the existing company base. Notable exceptions include the slowdowns on the urban portion of US 29 through Charlottesville which provides

access to markets in the Northeast, and low speeds on the US 501 access through the mountains to I-81. However, the lack of interstate access *is* a barrier when recruiting businesses from outside the region. Despite the availability of four-lane subdivided highways, interstate access is often viewed as a “check box” within the site selection process. Marjette Upshur echoed this view of interstates as a barrier for firm recruitment. While there are many collaborative efforts between Roanoke and Lynchburg, Roanoke is at times considered to be a competitor of Lynchburg by some regional experts, in part because of its access to I-81. J. Philip Gottwals has observed through consulting to the agricultural and food manufacturing industries that trucks frequently carry products into Lynchburg but leave empty—an indication of some trade imbalance, despite the existence of freight-generating industry in the region.

With respect to tourism, the region is successful at attracting statewide meetings and events, primarily because of its central location, but faces difficulties attracting tourists from outside the state. The region recently benefited from its central location within the state by attracting the Commonwealth Games from Roanoke for at least five years. The Commonwealth Games is an Olympics-style event for young Virginians, and a large factor in Lynchburg winning the contract is that the city is one hour closer to northern Virginia than Roanoke is. Lynchburg will also host a large Harley Davidson rally that was previously held in Williamsburg.

Air service is also a limitation—albeit one shared by many smaller communities across the United States. American Airlines offers six arrivals and six departures most days from Lynchburg, through Charlotte International Airport.⁶² This stands in contrast to the four airlines that serve Roanoke-Blacksburg Regional Airport⁶³ and three airlines that serve Charlottesville Albemarle Airport.⁶⁴ Because of the restricted nature of commercial service at the airport, even relatively minor reliability issues can have a disproportionate effect on the image of the region. As described by Ms. Lucas and echoed by Ms. Upshur, “It only takes one CEO before an entire company is frustrated.” Ms. Upshur also views air access as a particular challenge for international companies that must maintain connections to other offices across the globe.

One asset that ameliorates the region’s highway and air accessibility constraints is the Amtrak service that connects Lynchburg with Washington, DC in just under four hours (as well as to other points along Amtrak’s Northeast Regional and Crescent corridors). Mr. Troubetzkoy reports that tourists do use Amtrak to access the area, and his agency has promoted further travel by placing advertisements in magazines offered on trains. Amtrak service is particularly relevant to tourists without cars, including residents of major cities in the Northeast (Boston, New York, Philadelphia, and Washington, DC), a market that has traditionally been strong for the Virginia Tourism Industry, and international travelers. Similarly, Ms. Upshur and Ms. Lucas regard the introduction of Amtrak service as a major success and value to the community. The availability of Amtrak service to Washington, DC, in particular is helpful for business connections, as well as point of appeal when recruiting new hires considering moving to the area. Rail infrastructure is also viewed as an asset from a freight perspective. However, Ms. Lucas notes that it can be a challenge to assemble larger parcels of land along freight rail spurs.

⁶² Airline Information, Lynchburg Airport. <http://www.lynchburgva.gov/airline-information>

⁶³ Airport Info, Roanoke-Blacksburg Regional Airport. <http://www.roanokeairport.com/airport-info>

⁶⁴ Airlines. CHO Airport. <http://www.gocho.com/airlines/>

Finding workers can be a challenge for business.

Regional experts offered a two-pronged perspective on the regional workforce: According to Ms. Lucas, the culture of the *existing* employment base is very loyal, with a population of long-standing employees working for major companies in the area. Ben Bowman echoed this view, stating that the region has one of the best and largest advanced manufacturing workforces in the state. However, when companies do search for new candidates, particularly for entry-level positions, they face continual challenges in the area of workforce development: Ben Bowman summarizes the complaints heard most often from local businesses: applicants do not have the right skills and employees are not sufficiently motivated. One employer in the region describes the problem as “life skills void,” expressing that employees often lack direction and fail to arrive at work on time. Attracting the right workers in the agricultural sector appears to be such a challenge that farming businesses sometimes forgo contractual sales opportunities out of fear of future labor shortages and poor worker performance. These businesses also face the added challenge of seasonal worker shortages during growing and harvesting periods.

Transportation affects at least one employer’s ability to access the region’s labor force. Mr. Bowman is aware of a call center that has expressed a need for improved bus service, citing the inability of current employees to reach work. Responding to a similar need, Liberty University partners with the local transit agency to provide transportation for its students and employees.

Looking forward, the region anticipates a large wave of retirements in the near to mid-term future that is likely to exacerbate current workforce challenges. Ben Bowman is closely involved with regional efforts towards building a stronger education and training system to meet future workforce needs.

National demographic and industry trends are changing Lynchburg and its economy.

Many of the regional experts pointed to national trends that are changing Lynchburg and its economy. As described by Ms. Lucas and Ms. Upshur, the region’s economy relies on the cornerstones of higher education and health care, with important activity also occurring in manufacturing and financial services. In recent years, both Ms. Lucas and Ms. Upshur noted struggles associated with firm buy-outs, reorganization, and/or consolidation that resulted in losses within the Lynchburg region. For example: Nationwide, AREVA, and Genworth have all experienced corporate restructuring that has in some cases resulted in employment loss within the region. This type of job loss poses a challenge for the economic development community, as it is more influenced by a firm’s national or international corporate strategy than by any action or inaction by the region itself.

Despite losses, regional experts consider the region’s employment base to be relatively stable, with the core of the gains concentrated in existing business expansions rather than attraction of new firms. Nevertheless, because of the recession and the contraction of the international nuclear energy sector—an anchor in Lynchburg—the region is now thinking more actively about firm recruitment, entrepreneurial activity, and diversification, as well as a long-standing focus on supporting existing businesses.

Ms. Upshur emphasizes a focus on economic empowerment and a concept known as retooling: “How do I take the skills of the workforce that attracted manufacturing in the first place and train them up to become the next generation?” She argues that this focus necessitates an emphasis on broadband access,

as well as on lifestyle issues associated with the ability of the region to attract and maintain Millennials. She suggests moving towards consideration of public transportation as an urban amenity, rather than a service primarily serving low-income residents. The region is also focused on STEM initiatives and building a workforce with marketable skilled trade competencies. Education is a growing sector and is expected to continue to grow. Liberty University, in particular, has experienced considerable growth and creates value for the region by attracting young people who then become a viable next generation of workers.

Ms. Upshur pointed out that there is considerable value in the community at present that could be more effectively marketed: The cost of living, the quality of local amenities and neighborhoods for raising a family, the lack of congestion, and the approachability and openness of government to business are all quality-of-life values that should be actively communicated. Ms. Lucas supplements this list, pointing towards the advantages of the region in terms of water and power access, the workforce base, and the educational system.

Interviewees observe a growing number of young people who are choosing to remain in the Lynchburg region after graduating from area colleges and universities. Mr. Gottwals believes that a growing population of young, educated people are creating an entrepreneurial and placemaking culture in the region, including within the agricultural sector. He feels that a prevailing attitude of “the future is what we make of it” is replacing older, more defeatist attitudes concerning the decline of the tobacco industry and the impact of NAFTA on jobs. As a result, downtown Lynchburg has become more vibrant. Regional attractions that are currently the subject of improvement efforts include the Amazement Square Children’s Museum; the James riverfront trail and park; and Poplar Forest, Thomas Jefferson’s private retreat. Developers are responding to signs of downtown Lynchburg’s resurgence, especially, by building at least one new hotel (bringing the total number to four). Mr. Bowman believes that downtown Lynchburg has the potential to rival that of Savannah, Georgia, within a few years.

Moving forward, Ms. Upshur believes that Lynchburg should look to other regions that are diversifying the economic base—citing Chattanooga, TN, and Asheville, NC, as notable models. Ms. Lucas points to peer communities in mid-sized metropolitan areas with universities, including Columbia, MO; Lincoln NE; Fort Wayne, IN; Lexington, KY, and Chattanooga.

TRANSPORTATION SERVICE PROVIDERS

The consultant team participated in a series of discussions with major transportation service providers, addressing both freight and passenger transportation considerations, with particular emphasis on inter-regional connectivity. Findings from interviewees are in some cases supplemented by additional data. Findings are organized by mode.

Lynchburg Regional Airport

The project team interviewed Mark Courtney, director of Lynchburg Regional Airport, and Rusty Harrington, from the Virginia Department of Aviation. Lynchburg Regional Airport (LYH) provides vital commercial service connections to the American network via six daily arrivals and departures to/from Charlotte International Airport. With its 7,100-ft runway, it exceeds the Virginia minimum objectives for

a commercial service airport (5,500 ft.)⁶⁵ and meets the requirements for regional jet service. According to Mr. Courtney, the airport service area (corresponding to the Lynchburg MSA boundaries) experiences some leakage, with residents choosing to travel to other airports for air service: 16 percent travel to Roanoke, 10 percent to Raleigh Durham, 7 percent to Richmond, 4 percent to Charlotte, Charlottesville, and Greensboro, respectively, and 3 percent to Dulles.⁶⁶ According to regular user surveys, LYH serves a mix of approximately 55.5 percent business users and 45.5 percent leisure.⁶⁷

Unlike Roanoke airport, LYH has little air cargo activity. The airport does support charter services including large-scale charter services for the Liberty University sports program. LYH also supports the vibrant and growing Liberty University School of Aeronautics with over 30 training aircraft and approximately three hundred students. Mr. Harrington observed that there may be opportunities for further growth of training activities at LYH. Liberty University interacts with the airport in many different ways, including scheduled air service used by students, utilization of business aviation, and ownership of a fixed-base operator that leases space and provides services at the airport (Freedom Aviation).⁶⁸ Other corporate users of the airport include Centra Health, which maintains a medical evacuation service at LYH, as well as AREVA and Banker Steel, both of which make use of based business aircraft. The State Police operate an aviation unit out of LYH.

According to Mr. Courtney, the primary goal at the airport is maintaining the existing level of commercial service. Mr. Harrington provides background on a number of national and trends affecting Lynchburg's commercial service including consolidation of aviation activity to the largest airports, airline mergers, the further entrenchment of the hub-and-spoke, and the trend towards larger planes with higher load factors operating fewer flights overall. Each of these trends puts pressure on smaller airport markets like that in Lynchburg. Statewide, Mr. Harrington stated that airports are operating considerably below capacity. Mr. Courtney views airline consolidation in particular as a risk factor into the future for LYH.

Mr. Courtney does not consider facility conditions, ground access, or costs borne by airlines at LYH to be barriers to airport use or success. Rather, the size of the regional economy and per capita income tend to drive the potential passenger market for air service and this is what constrains the ability of LYH to attract additional commercial flights. Mr. Courtney in fact believes that the quality of ground access is a strength offered by LYH. Both Mr. Courtney and Mr. Harrington describe the Lynchburg airport as an origin rather than a destination airport. It is therefore sensitive to the degree of demand generated by local industry and the local population. Statewide, DOAV sees access for visitors from an airport to major regional attractions and activity centers as a key factor in airport accessibility.

⁶⁵ DOAV. Virginia Air Transportation System Plan Update. 3. Facilities Objectives Analysis. 2016. http://www.doav.virginia.gov/Downloads/Studies/VATSP%20Update%202016/600%20DOAVAS%2020160406%20VATSP%20Update-04%20Chapter%203%20Facility%20Objectives_Web_acsbl.pdf

⁶⁶ MIDT Data Oct 2014, Mead & Hunt, provided by Mark Courtney.

⁶⁷ October 2012 Lynchburg Passenger Survey. Data provided by Mark Courtney.

⁶⁸ Gore, Sherese A. Lynchburg City Council approves airport lease. The News & Advance. http://www.newsadvance.com/work_it_lynchburg/news/lynchburg-city-council-approves-airport-lease/article_a7da9a27-182d-5237-ad40-0b3b2a78746d.html

Going forward, the airport does not anticipate significant growth in facilities. Investments will be focused on maintenance. Lynchburg is one of two commercial Virginia airports without nonstop service to Washington Dulles. The Governor's recently released FY 2017-18 budget includes \$50 million targeted at reducing per-passenger airline costs, with the intent of helping airlines, and particularly United, grow Dulles as a domestic hub. The hope is that this may ultimately enable additional service at other Virginia airports. Local economic development strategies have at times considered land development on or near the airport. From the perspective of the airport manager, LYH does have more developable sites for aeronautical uses than nearby Roanoke, but these are not necessarily competitive compared with the eastern seaboard as a whole. For non-aeronautical uses, the airport does have land, but it is not clear at this point if the land presents advantages over other sites in the region.

Marine and Rail Freight Transportation

The project team met with representatives of Norfolk Southern and the Port of Virginia, discussing issues of freight transportation and regional competitiveness. These discussions have been supplemented within supporting research.

The Lynchburg region is served by two Class I railroads, Norfolk Southern and CSX, that intersect in the City of Lynchburg. Rail freight service is available from both rail companies with a number of sidings throughout the region. The double-stack capable intermodal routes of the Heartland and Crescent Corridors also run through Lynchburg. The Crescent corridor connects the U.S. Northeast to the Southeast, and serves the Virginia Inland Port in Front Royal, Virginia. The Heartland Corridor provides access between the Port of Virginia (Hampton Roads region) and the Midwest. However, Lynchburg itself is not an intermodal terminal. The nearest NS intermodal terminals are located at Greensboro, NC; Front Royal, VA; Prichard, WV; and at the Port of Virginia itself.⁶⁹ CSX has intermodal terminals in Charlotte, NC, and at the Port of Virginia.⁷⁰ The Port of Virginia's Hampton Roads terminals are located approximately 200 miles east of Lynchburg.

According to Jeff Florin of the Port of Virginia, 34 percent of cargo arrives at the Port by rail. The port anticipates significant growth, including increases in market reach towards the Midwest because of the Panama Canal expansion. Virginia has a current channel depth of 50 feet, with plans to dredge to 55 feet. The Port is one of the few places on the East Coast that can already handle the largest ships that will be accommodated by the Panama Canal expansion.⁷¹ Mr. Florin anticipates increased consolidation in the shipping industry towards bigger ships and ports to heighten efficiency. Growth at the port may increase traffic levels on Route 460, in addition to demand on the rail network. Mr. Florin also mentioned recent discussions of an additional inland port in Danville, commenting that the prospects for an additional inland

⁶⁹ Norfolk Southern. Intermodal. <http://www.nscorp.com/content/nscorp/en/shipping-options/intermodal/why-norfolk-southern-intermodal/our-network.html>; <http://www.nscorp.com/content/nscorp/en/shipping-options/intermodal/terminals-and-schedules/prichard-wv-heartlandintermodalgateway.html>

⁷⁰ CSX. Intermodal. <http://www.intermodal.com/index.cfm/intermodal-maps/>

⁷¹ Vessels sized to the current (pre-2016) dimensions of the Panama Canal are called Panamax vessels; those exceeding these dimensions are called Post-Panamax vessels.

port in Virginia are not strong, given the existing Front Royal, VA and recently opened Prichard, WV⁷² facilities. Rail traffic along Norfolk Southern's corridor paralleling US-29 (part of the Crescent Corridor) is also significant because of traffic from the intermodal terminal in Greensboro, NC.

Representatives⁷³ of Norfolk Southern reported anticipated potential growth overall in intermodal demand, but contraction in coal. In the Lynchburg region, they see business increasing for plastics and chemical related companies. Norfolk Southern representatives report that the Lynchburg and Campbell county area has a large inventory of industrial sites, but relatively few are rail accessible. They suggested that the region might identify a specific area with a density of rail-accessible sites, and then market them together to be more competitive. For example, there is a larger site near the airport with rail and highway access. Other suggestions are to improve sharing of information regarding heavy industry business prospects between localities and service providers and to improve the region's collective understanding of "pad ready" requirements for freight-reliant industries. Norfolk Southern does not see any major rail capacity constraints affecting the region; at-grade-crossings in the Lynchburg area are comparable to other regions.

Amtrak Passenger Rail Service

The project team met with representatives of the Virginia Department of Rail and Public Transportation (DRPT), Lynchburg District VDOT, and Amtrak⁷⁴ to discuss passenger rail trains serving Lynchburg. In 2009, DRPT began supporting regional intercity rail service, starting with daily service from Lynchburg to Washington, D.C.⁷⁵ In the first year of operations, the new service achieved an annual ridership of 126,072, vastly exceeding its yearly target of 51,000.⁷⁶ From FY11 through 15, Lynchburg station saw an average of 85,458 annual boardings and alightings.⁷⁷ Amtrak service at Lynchburg connects residents into the Northeast Regional and the Crescent corridors, with access to points as far north as Boston, and as far south as New Orleans. Traffic demand from Lynchburg is dominant to the northeast. The Smart Way Connector bus services between the Lynchburg Amtrak station and Roanoke, as well as Blacksburg, VA are also popular, serving approximately twenty people per day.

By Fall 2017, Amtrak service will be extended to Roanoke. As part of that extension Amtrak will add additional service, bringing the overall number of trains serving Lynchburg to six.⁷⁸ The Town of Bedford

⁷² Hutchins, Reynolds. "West Virginia opens first intermodal terminal." December 2015. Journal of Commerce. http://www.joc.com/rail-intermodal/inland-ports/west-virginia-opens-first-intermodal-terminal_20151228.html

⁷³ John Edwards and Dan Motley.

⁷⁴ Pete Burruss and Jeremy Latimer, DRPT; David Cook, Lynchburg District VDOT; Jay McArthur, Amtrak.

⁷⁵ DRPT. 2013 Virginia Statewide Rail Plan. <http://www.drpt.virginia.gov/media/1135/vsrp-2013.pdf>

⁷⁶ Amtrak Virginia. Lynchburg Amtrak Virginia Service Exceeds Yearly Performance Goals: Clear demand for intercity passenger rail service. <https://www.amtrak.com/ccurl/346/193/ATK-10-153%20Lynchburg%20Year%20End%20Ridership%20.pdf>

⁷⁷ Amtrak Fact Sheets, Commonwealth of Virginia. <https://www.amtrak.com/state-fact-sheets>

⁷⁸ Gore, Sherese A. "Lynchburg Amtrak passengers to get more rail service next year." The News and Advance. 11 June 2016. http://www.newsadvance.com/news/local/lynchburg-amtrak-passengers-to-get-more-rail-service-next-year/article_8cf9ba95-399c-5edd-b735-c1cc434297ac.html

is currently studying the potential viability of service as part of the Roanoke extension, in an effort to convince the state to reconsider an initial decision to not have service stop in the town. Looking forward into the future, North Carolina DOT recently recommended a study of the Lynchburg-Charlotte passenger rail corridor (currently serviced by the Crescent service), investigating the potential to extend “an additional Amtrak Northeast Regional passenger train from Lynchburg south to serve Greensboro and Charlotte.”⁷⁹ In addition, the Virginia Statewide Rail Plan (2013) outlines a long-term vision for service between Lynchburg and Richmond⁸⁰ as part of what is known as the proposed “TransDominion Express.”⁸¹ However, no immediate plans exist to pursue this connection.

The VDOT and DRPT representatives note certain challenges with providing passenger service. Customers demand consistent levels of service. However, reliability has been harder to deliver in long-distance “system trains” such as the Crescent corridor. This is an important issue for rail attractiveness relative to other modes. Access by non-vehicular modes (transit, walk, bike) was also mentioned as an issue of importance to the continued success of passenger rail services.

Public Transportation

A follow-up conversation with Chris Arabia of DRPT provided additional insight into public transportation conditions in the region. The Greater Lynchburg Transit Company (GLTC) is the largest transit operator in the area. Liberty University is a major driver of demand for GLTC. The University helps fund GLTC and has Liberty University branded buses serving the campus. Altavista Community Transit System operates a smaller system. Additional alternative transportation options include demand-response services as well as van pooling/carpooling programs (including park and ride facilities) coordinated by RideSolutions, the region’s Transportation Demand Management (TDM) Agency. RideSolutions is a unified platform serving the greater New River and Roanoke Valleys and Region 2000 regions of southwestern Virginia and offers a model for super regional collaboration on ride sharing.

Looking forward, the region is about to begin its next Transit Development Plan (required every five years). DRPT stated that there may be some expansion planning within that process. The last TDP resulted in a successful HB2(Smart Scale) application for a downtown circulator service vehicle. Mr. Arabia also suggested that now might be the time to explore greater park and ride shuttle service for rural employers as well as the potential for super regional transit between Roanoke and Lynchburg.

⁷⁹ NCDOT Rail Division. Comprehensive State Rail Plan. August 2015.

<https://connect.ncdot.gov/resources/RailPoliciesDocument/2015%20Comprehensive%20State%20Rail%20Plan-%20Full%20Report.pdf>

⁸⁰ DRPT. 2013 Virginia Statewide Rail Plan. US 29, US 460, and I-81 Passenger Service (pg. 5-13).

<http://www.drpt.virginia.gov/media/1135/vsrp-2013.pdf>

⁸¹ TransDominion Express. <http://www.tdxinfo.org/>

BUSINESS PERSPECTIVES

Nuclear Energy

The study team reached out to the two large nuclear firms in the Lynchburg region, BWX Technologies (BWXT) and AREVA. BWXT Nuclear Operations Group located in Lynchburg, VA, manufactures nuclear components for the U.S. government, supplies research reactor fuel elements for colleges, universities, and national laboratories, and converts or downblends uranium for use in commercial reactors for electricity generation. The location employs approximately 2,150 people.⁸² AREVA has approximately 1,200 employees located throughout the Lynchburg region engaged in a variety of engineering, product development, R&D, and diagnostic/support activities for the nuclear energy sector. The firm manufactures equipment for diagnostics and monitoring of reactors, conducts analyses of wear and tear on the U.S. light water reactor fleet, and services reactors during planned outages as well as unplanned “emergent work.”

Findings

BWXT opted not to participate in a detailed interview, indicating that transportation does not affect the company’s competitiveness or present issues at this point.

AREVA, like many firms, relies on the transportation network for access to workers, business travel, and goods movement. The manner in which AREVA utilizes the network depends in part on the nature of the business activity involved, with notable differences for planned versus emergent work.

Driving is the dominant mode used by AREVA employees. Public transportation is not viewed as a viable option. Because the road network is in good condition with very limited effects from congestion, the reliance on driving is not considered problematic. In fact, a short commute is viewed as a selling point when recruiting. Other assets including low housing and land prices and the quality of the region for raising a family (including the many outdoor recreational opportunities in the area) are also selling points, particularly when recruiting mid-career professionals. However, there are lifestyle issues that do affect AREVA’s ability to recruit younger talent from outside the region. Many of the best students are accustomed to a certain vibrancy of social environment that Lynchburg cannot fully provide. Within this context, the perceived isolation of Lynchburg becomes even more of an issue. People think of Lynchburg as “hard to get to,” making potential talent unwilling to relocate. The Amtrak connection to DC is of value in this conversation but needs to be advertised more broadly.

AREVA has a considerable need for “on-the-clock” travel, ranging from moving large numbers of staff to locations throughout the U.S. to perform work on reactors during planned outages, moving staff on short-notice to deal with unplanned issues, and sending management for coordination around the globe. AREVA uses Amtrak service to travel to meetings in Washington, DC, with the Nuclear Regulatory Commission and the Nuclear Energy Institute. Train service provides value in that it is affordable, reliable, and allows employees to be productive rather than sitting in Washington, DC, congestion. To access other more

⁸² BWXT NOG LYNCHBURG. <http://www.bwxt.com/about/operations--locations/bwxt-nog-lynchburg>

remote destinations, air service in Lynchburg does pose a problem. A manager may choose to drive to Dulles to take advantage of one-stop service to both domestic and international destinations. AREVA has two major locations, one in Lynchburg, VA, and one in Charlotte, NC (the headquarters). Highway connections between the two offices are sufficient and allow for one-day roundtrips. However, the Charlotte location has an advantage when it comes to international connections. AREVA moved its headquarters to Charlotte in part because of the better air service, particularly for access to its parent company in France. Nevertheless, the Lynchburg-area locations remain at the core of AREVA's U.S. activities. Lynchburg operations could not be easily relocated for two reasons: (1) the legacy of investment in specialized manufacturing and testing facilities in the region, and (2) the value of the existing workforce that cannot be easily replaced.

AREVA relies on the highway network for movement of inbound raw materials and shipping of equipment to sites throughout the country. AREVA does not rely heavily on air or rail cargo service. Highway connections to the Interstate system are critical, including Route 460 from Roanoke, and Route 29 north from Charlotte or south from I-66. Highways are in good condition and offer no major issues, with the exception of the urban non-bypass section of Route 29 through Charlottesville, which can add a half hour of travel time. Nevertheless, this extra time does not necessarily pose problems for most freight transportation needs, except in cases of unplanned work that demands rapid delivery times.

AREVA is sometimes faced with unplanned work at reactors where they need to move both staff and/or equipment to locations in as short a time as possible. When a reactor is down, every day costs on the order of a million dollars in lost revenues for AREVA's clients. In these cases, the company will make a strategic determination as to the most effective way to move people and equipment. Oftentimes scheduled commercial air service provides the best option. However, given the limitations of service at the Lynchburg airport, staff will sometimes drive to Roanoke instead, where there are a few additional options including the ability to connect through Atlanta to many different destinations. If special equipment must be transported that exceeds the cargo options available on scheduled air service, the company will hire a trucking company. The firm has also had cases where instead of either driving or utilizing commercial air service, staff or equipment is moved via the company's jet out of Lynchburg Regional Airport. The decision is driven by the urgency of the situation, and in some cases by congestion on the road network (for example, along Route 29, to I-66, to the Washington Beltway). In one case, a Florida plant had a loose part that was unidentified; AREVA flew staff down in the private jet, picked up the part inside a large lead container, and flew it back to Lynchburg for analysis.

A significant portion of the AREVA workforce will be eligible to retire within the next five years, making recruitment and retention an important strategic focus. The firm aims to capitalize on quality of life factors when recruiting those with families or looking to start families, and to use Amtrak to help combat the narrative of remoteness when recruiting younger staff. In general, AREVA operations in Lynchburg are expected to remain stable. As nuclear plants age in the U.S., the demand for AREVA's Lynchburg workforce will remain relatively constant, with a focus on engineering design and small-scale manufacturing in support of plant operations. Rail freight will most probably not become an issue in the future; even if the nuclear industry has a resurgence, AREVA is unlikely to manufacture the type of larger equipment in Lynchburg that would point towards reliance on rail service. When there are cyclical periods of growth or high-demand, AREVA is most likely to "staff up" with contractors in the Charlotte area than in Lynchburg.

Short-term contractors relocate temporarily for work and therefore prefer cities with easier options for returning home.

Advanced Manufacturing

To provide insight into the connectivity perspectives of high-tech manufacturing, the study team interviewed a representative of AMTI Advanced Manufacturing.

AMTI Advanced Manufacturing has been in business since 2003 producing high-tech electronics, primarily in the defense, aerospace, and telecommunications space, with additional commercial, industrial, and energy sector clients. AMTI has 88 employees in Lynchburg, including engineers and many who work in fabrication on the shop floor. In terms of geographic market reach, AMTI has 130 clients, only three of which are located in the Lynchburg region, with the majority of AMTI's clients located outside the Commonwealth of Virginia. Approximately ten percent of AMTI's customer base is international (including the United Kingdom, Japan, Taiwan, Israel, Singapore, China, Germany, and clients in South America).

Findings

AMTI employees work in single extended shifts or split shifts, with operating hours between 6 am and 6 or 7pm. Employees drive to work and the firm is unaware of any bus usage. AMTI produces small, high-value products and relies on UPS and FedEx for movement of inbound and outbound goods. These integrated carriers make deliveries to and from the plant and (presumably) move goods using a mixture of air and truck services. AMTI relies on both the highway network and air service to remain in close coordination with clients, with AMTI staff traveling to client locations and clients visiting the AMTI facilities in Lynchburg. When using air service, the decision is sometimes made to drive to Roanoke rather than to Lynchburg Regional. Clients have at times expressed irritation with the limitations of air service (e.g. limited service frequency, the necessity of connecting through Charlotte, the limitations in international service in Charlotte once there). However, the president of AMTI does not believe air service to be a significant limitation on competitiveness, noting that the lower cost of overhead in Lynchburg still makes AMTI and the area attractive. In fact, AMTI is co-located with EDM (Electronic Design & Manufacturing Company) and Wegmann USA, two other advanced manufacturing firms, in what the president of AMTI describes as a "cluster."

AMTI also does not view the lack of an Interstate as a meaningful barrier, despite what is often expected a priori; the outer Washington, DC, area is accessible within three hours, and multiple airports are accessible within approximately two hours and fifteen minutes (Lynchburg, Roanoke, Charlottesville, and Richmond). Despite the general quality of highway connections, the lack of a bypass around Charlottesville is reported as an issue. Nevertheless, truck drivers do not complain about accessing the region, in AMTI's experience.

AMTI positions itself within a global market and therefore thinks globally when considering competitors. Factors such as labor migration patterns within the US and international currency exchange rates affect AMTI. Outside Virginia, both South Carolina and California are competitive locations, with Virginia, Roanoke and Sterling (located within the greater Washington, DC, metro area) reported as meaningful competitor locations inside the Commonwealth. Beyond transportation, AMTI faces a number of

challenges, including the burden of regulatory requirements for small businesses and challenges in finding the right workforce. In order to manage tax and other regulatory requirements, AMTI reports the need for both inside and outside legal counsel, suggesting that this burden may be a barrier for other similar firms as well. In addition, AMTI is concerned about the upcoming available workforce, pointing to a “lost...generation of skilled electronics workers.” To address this challenge, AMTI is engaged in active community promotion of STEM education, including support of the Future Focus Foundation (a group working to expand STEM opportunities for K-12 students within the Region 2000 geography), and participation in a two-year high school apprenticeship program. Given that it “takes top talent to be successful,” AMTI continues to be engaged in the issue of talent development.

Retail, Wholesale, and Distribution

The study team interviewed representatives of J. Crew and Moore & Giles, two companies involved in the apparel industry, addressing retail, wholesale, and distribution issues.

J. Crew employs approximately 1,100 employees at an E-commerce facility in the Lynchburg region, operating in customer fulfillment and distribution. Moore & Giles, founded in Lynchburg in 1933, designs and develops luxury leathers for the high-end hospitality, aviation, and residential interior design industries. The firm employs approximately 100 full time employees at its headquarters in Forest, Virginia, operating a 120,000 square foot warehouse facility, and maintains strategic partnerships with tanneries in Spain, Italy, New Zealand, South America, and the Far East.

Findings

Both J. Crew and Moore & Giles rely heavily on the highway network for goods movement, including use of integrated carriers such as FedEx, USPS, and UPS. J. Crew Lynchburg does use air freight when products must go out rapidly. Moore & Giles reports exporting products using air service via FedEx and UPS, presumably through Roanoke airport. Most J. Crew employees commute by car, with some taking the bus or biking to the facility; some employees travel as far as sixty miles.

The director of J. Crew Lynchburg operations reports that no major transportation issues affect business operations. The human resources manager in Lynchburg does, however, note workforce issues including a lack of skills, and a struggle to meet seasonable hiring requirements during the holidays; the warehouse employs an additional 300-400 people who work for six weeks during the peak period. The temporary nature of those jobs may deter workers. Hiring is also constrained by the size of the regional labor market and high labor market churn. Because J. Crew draws from a relatively small labor pool, previously employed workers sometimes reapply for positions after having moved to other companies. In the future, J. Crew Lynchburg anticipates continued pressures towards reduced time windows for customer deliveries, possibly resulting in increased automation and less labor intensity.

The Moore & Giles experience is more mixed when it comes to the adequacy of the transportation system serving the region. While the freight transportation network is viewed as adequate, passenger services that facilitate business travel are an issue. The firm reports difficulty in using Lynchburg Regional Airport because of high ticket prices, as well as the inconvenience of a single airline offering service through Charlotte, only. The president of Moore & Giles echoed thoughts from AMTI about the limitations of

international service at Charlotte once there, and speculates that many companies in the Lynchburg area are likely to find air service a frustration. Amtrak's Northeast Regional service is viewed as a competitive option, while the Amtrak Crescent Corridor is not attractive because of on-time performance problems. In the future, better and more reliable service going south to Charlotte would be of value.

Health Care

The health care sector is a cornerstone of the Lynchburg regional employment base. To explore the connectivity needs of this major population-serving sector, the study team interviewed representatives of Centra Health. Centra Health is a regional health care system incorporating a number of hospitals (e.g. Lynchburg General, Virginia Baptist Hospital, and Bedford Memorial Hospital), long-term care facilities, and physicians' offices, as well as the Centra College of Nursing. Facilities are spread throughout central Virginia, as far west as Bedford, up to Amherst, down to Danville, and east to Farmville. Centra employs a little over 7,000 employees in the greater Central Virginia region, with approximately 6,000 in Lynchburg and its immediate environs, an additional 400 in Bedford, and 600 in Farmville. Their newest areas of expansion have been to the south, with on the order of 100 employees each at locations in Gretna and Danville.

Findings

Centra Health relies on the transportation system for freight, employee, and customer access. Customer access in particular is a considerable issue of interest in general for the health network. With respect to freight, Centra uses the transportation system for supplies and for movement of outgoing waste materials—primarily by truck. The network relies on courier services to move lab specimens within its network. This network has become more complex over time and Centra uses a mix of contracted and in-house providers.

Like the Lynchburg region as a whole, the dominant commute mode for Centra Health employees is the personal automobile. However, Centra also has employees using the local bus system, particularly lower wage earners who find transit to be a more affordable transportation alternative. Lynchburg General Hospital is a 24/7 operation with shift changes occurring at 7 am, 3pm, 7pm, and 11 pm. Daytime transit use is feasible, but employees needing to commute later at night (nearly as many employees as during the day) face transit availability challenges. Those who use transit generally live closer into the core of Lynchburg. Overall, the region is not subject to significant congestion, enabling those who commute by car to live as far as 25 or 35 miles away without experiencing an issue. Relevant roadway facilities include Route 60, 29, and 221. The only significant congestion mentioned by a Centra representative is along Route 221 between Lynchburg and Forest. This corridor has a density of housing development causing slowdowns. While the human resources staff of Centra sometimes warn new hires about a slightly longer commute associated with that location, there is ample housing and land to accommodate demand elsewhere in the region.

Centra Health conceives of US 29 as a north-south spine of activities and works to cluster facilities along that spine. In recent years, Centra has made efforts to focus growth south towards the Danville area and is currently in the process of setting up a major facility there (planned to open in 2017) to house urgent care and provide a centralized location for physicians' offices. This is part of an overall trends of

“regionalization” affecting the health care sector nationwide. As a result of provisions within the Affordable Care Act that emphasize “population health,” health care providers are decentralizing services away from the hospital, providing more distributed points of access throughout the community. Unlike the situation 10 years ago, payments are now based on wellness of the population and health care networks are working to keep people out of hospitals, rather than on billing services within a hospital. In spatial terms, this trend has made Centra a more regionalized system.

In some ways, the regionalization trend reduces transportation requirements by co-locating services (particularly emergency services) with centers of population. However, there is still a need for various forms of patient transportation within Centra’s spread-out service area and network of specialists. Centra provides a variety of transportation services ranging from emergency and advanced life support to routine non-emergency transport. For example, Centra operates a shuttle along the corridor between Farmville and the Alan B. Pearson Regional Cancer Center located in Lynchburg, and ambulatory transport is provided along the US 29 corridor south of Lynchburg. In operating such services, Centra must follow government regulations that preclude the “steering” of clients away from other health care markets. Centra works on an ongoing basis to improve access to care, particularly for those with chronic illness and fewer resources. Centra’s Community Access Network Program is central to this effort and works to provide primary care access while reducing inappropriate use of emergency departments. Centra remains interested in the role that can be played by public transportation in facilitating patient access.

Centra Health has experienced rapid growth and investment in the last three years, with 42 percent increases in staffing over that period—most concentrated beyond the core of Lynchburg. As a result of this expansion, Centra is in the midst of a recruitment phase and has faced challenges in the workforce arena. Recruitment pressures are likely to continue into the future given the aging health care workforce and anticipated retirements in all categories of staffing (e.g. doctors, nurses, and pharmacists). Centra Health also competes for the same workforce as Carilion to the west (Roanoke area) and the University of Virginia in the Charlottesville area to the north. The airport is used for recruitment; while the air service is limited, the facility is functional, and has the advantage of quick access/egress. Centra works on talent development through partnerships with colleges and universities. The network hires a considerable number of Liberty University graduates, but turnover is high; non-local students will stay for a few years, gain experience, and the move back home or elsewhere. The student bodies of Lynchburg College, Randolph, and Sweet Briar have a more local base. The Centra representative theorized that students from Lynchburg college are the most likely to stay in the area and become part of Centra’s available workforce. Human resources staff at Centra use the lifestyle in the Lynchburg area as a selling point in recruitment including the quality of the educational system, health care, and the value of outdoor recreational opportunities. Transit availability and pedestrian and bicyclist accessibility does not come up as often. Lynchburg’s lack of an Interstate can be perceived as a hindrance in that it makes the region feel remote and therefore less attractive to talent that might be recruited from outside the region.

Finally, representatives of Centra Health cite challenges related to the location of the hospital in Lynchburg, mentioning long drive times from more remote locations as a deterrent and a difficulty in wayfinding, aka navigating to the hospital. Given the growth trends to the south and west of Lynchburg, some have asked whether there is a need for a new hospital location in a more accessible greenfield location. While not an immediate proposal, this question speaks to the importance of access in maintaining the competitiveness of the health network.

Transportation Services and Heavy Industry

The study team interviewed representatives of two business involved in the production or movement of bulk materials: Georgia Pacific – Big Island (GP-Big Island) and Thompson Trucking.

Georgia Pacific manufactures containerboard for packaging at a 125-year old mill in Big Island, in Bedford County, VA. The plant, located adjacent to the James River and a CSX rail line, employs approximately 335 people. Family owned and operated since 1948, Thompson Trucking is headquartered in Concord, VA and serves a variety of customers in Virginia, Maryland, Washington, DC, North Carolina, and South Carolina, with a focus on hauling waste materials, scrap, and aggregate. Thompson Trucking has operations in Roanoke, Concord, Danville, Petersburg, Chesapeake, Raleigh, Charlotte, and Stafford. Lynchburg area operations are focused on scrap metal, municipal waste, and aggregate products for the construction sector.

Findings

Thompson Trucking relies on some of the same routes as other interviewees in the region including US 29 and US 501. Because of their location in Concord along Richmond Highway, VA-24 is also an important connection to the US 29 corridor. The president of the firm reports some limitations of the roadway network in and outside the region including the southern non-bypass portion of US 29 through Lynchburg that is subject to congestion due to high levels of activity at Liberty University, and two-lane Route 307 connecting US 460 and US 360 heading east towards Richmond, which is subject to heavy tractor-trailer traffic. The congestion in the area of Liberty can add a non-trivial amount of time for truck trips, which affects overall costs as Thompson Trucking is paid by the ton, and not by the hour. Alternate routes face similar increases in congestion based on the expansion in activity at Liberty University, as well as associated housing development in the area. Thompson Trucking's president also expressed interest in the idea of converting US 501 to four lanes, in the same manner as was done in North Carolina.

GP-Big Island relies on both trucking and rail to transport inbound materials and outbound products. The plant has a CSX spur onsite and is accessible on the highway side via US 501, VA-122, and VA-130 across the James River. The plant relies on a variety of inputs including wood chips, bark and other residual wood products used as fuel, and recycled materials sourced from locations throughout the eastern part of the U.S. The plant has a major supplier chip mill that is vital to their operations located in Brookneal, VA, about an hour's drive southeast on US 501. Wood chips arrive by truck, only. The plant ships containerboard to clients located predominantly on the east coast, with a few locations in the Midwest. The majority (approximately 80%) of the plant's goods go to other Georgia Pacific box plants. The choice to use rail versus trucks is based in large part on customer requirements. If the containerboard must arrive more quickly, truck is used; if more time is available, product is shipped via rail. The plant has a number of constraints or common challenges facing it in terms of connectivity. First, the plant often experiences driver shortages on weekends. Second, the plant faces challenges in terms of the availability of empty rail cars, which reflects among other things market challenges associated with the value of the paperboard product (CSX reports limitation of profitability in serving the plant). The highway network itself is an ongoing but hard-to address challenge for the plant given the mountainous topography and relative remoteness of the site. For example, the most direct route from Brookneal runs through Lynchburg and up US 501. However, the portion of 501 from the northern boundary of Lynchburg to GP-Big Island is

restricted for vehicles over 65 feet in length due to the narrow mountainous nature of the roadway. Unfamiliar truckers frequently use this route anyway and are fined accordingly by local law enforcement. Similarly, trucks driving north from the Bedford area along VA-122 must frequently apply for special permits because of the many narrow bridges along the corridor. A prior issue associated with the condition of the VA-130 crossing of the James River is now being addressed with a bridge reconstruction project.

Neither Thompson Trucking nor GP-Big Island report major issues affecting the commute of employees. At Thompson Trucking, drivers arrive around 6:30 am and therefore miss peak period traffic. While afternoons may be slightly slower, it is not an issue overall. GP-Big Island employee commutes are vulnerable to accidents and other incidents along the narrow mountain access roads. However, the commute does not noticeably affect the plant's ability to attract and maintain workers. In general, GP-Big Island reports being able to fill advertised hourly positions quickly. More advanced engineering positions sometimes take longer to fill because the plant must recruit from outside the region. While IT positions are often filled from Liberty University, including through an IT co-op program, engineers are typically recruited from outside the region and even the state (e.g. Virginia Tech, NC State). When recruiting, GP-Big Island considers the reputation of the region and its scenic environment to be an asset, noting that people will have their own individual preferences about whether they want to live in a big city or a smaller town. While the plant expects a wave of retirements in the near future they are not concerned about their ability to find suitable replacements.

Thompson Trucking, on the other hand, reports significant workforce challenges in the last five to seven years, as large numbers of drivers have retired (and many more are expected to retire in the next three years). Thompson Trucking has struggled to find replacements of an equal caliber and dependability. The President describes how his firm works to support the construction industry on weekends, but that even at "time and a half" they struggle to fill positions. Moreover, the firm sees a gap between the available workforce and the firm's desired skills and certifications. Thompson Trucking requires drivers with Commercial Driver's Licenses (CDLs) and prefers hiring employees with basic trade skills who are able to diagnose and address minor vehicle issues while on the job. The President of Thompson Trucking suggested that his firm would benefit from better access to CDL training and trade skills training in the Lynchburg area.

GP-Big Island representatives report a number of other "connectivity" challenges affecting the firm including limitations in regional air service, rising electricity costs, and a lack of broadband service in Bedford County. GP's headquarters are located in Atlanta. To get there from Big Island requires a flight through Charlotte. Because of unreliability in air service in Charlotte, business trips to Atlanta for a half-day meeting have in the past take as much as three days of travel (with an unplanned overnight stay in Charlotte). The mill is also a major consumer of purchased electricity and therefore highly vulnerable to changes in electricity rates. In recent years, the plant's energy conservation efforts have not kept pace with increases in electricity rates. On the issue of broadband access, the plant is not directly affected because they have their own system in place, but the company is interested in better connections within a broader Bedford county program.

Moving forwards, Thompson Trucking does not anticipate major increases in activity in Lynchburg. The company has in fact consciously pushed into other markets (e.g. Charlotte, Richmond), precisely because

of the underlying economic growth trends in Lynchburg which limit the potential for Thompson Trucking's growth in the region. While the firm has deep roots in the Lynchburg area, the current outlook makes places like Charlotte more attractive for this type of business because both the demand and the highway infrastructure are superior to that in Lynchburg.

SUMMARY

Interviews and discussions with regional experts, transportation service providers, and business in the Lynchburg area reveal a number of common findings:

Highway Connectivity: The region's highway network is a reliable asset; congestion and delay in general is not an issue constraining performance, with a few specific exceptions (US 29 in Charlottesville, the southern section of US 29 near Liberty University, US 501 through the mountains). The lack of an interstate is a barrier less in actual mobility terms and more in how the region is viewed from outside—the perceived “remoteness” of Lynchburg can eliminate Lynchburg preemptively from the site selection process and can discourage potential talent that may otherwise consider relocating to the region.

Air Connectivity: Air service is viewed by many as a limitation in the region. Firms and regional experts vary in their opinion of the severity of this issue. Firms, like Moore & Giles, seeking to maintain a broader network of national and international connections are more severely constrained by air service levels, including limitations in international connections in Charlotte. Other firms have adapted by using other airports in the region and state. Some firms, like AREVA, maintain flexibility by keeping a company aircraft at Lynchburg Regional Airport. One advantage of the airport's size and facilities is the ability of passengers to get in and out rapidly, unconstrained by the types of congestion or lines that affect larger airports. Finally, because of the limitations in air service, stakeholders report that relatively minor reliability issues can have a disproportionate effect on the image of the region.

Rail Connectivity: The rail network is considered an asset for both passenger and freight accessibility and likely could be leveraged to a greater extent. On the passenger-side, easy access to Washington, DC provides value to firms both by enabling easy business travel, and by enhancing the image of the region for young talent interested in proximity to major urban centers. Increased reliability would further enhance the value and competitiveness of passenger rail. On the freight side, the convergence of two Class I railroads (CSX and Norfolk Southern), may offer potential for rail-oriented development and the region may wish to consider more focused efforts to assemble and market pad-ready industrial sites with rail access.

Labor Force Access: Workforce availability is a concern for many in the region, particularly given the dynamics of an aging workforce approaching retirement. Some identify gaps in available skills and motivation within the regional labor force, including interest in a better pipeline of STEM education and trade skills. Others cite specific challenges associated with attracting and maintaining young people, particularly those who are trained in the region's higher education institutions. While the region has experienced an increase in vibrancy for younger working professionals, particularly within the downtown area of Lynchburg, many still believe that the image of the region to outsiders is of a relatively remote and not particularly dynamic region. For mid-career professionals or those looking to start a family, many of

those interviewed believe the region provides great value, given the quality of schools and health care, the lower cost of living and low levels of congestion, and the quality of the natural environment.

Transit and Placemaking: Driving is the dominant mode of commuting for most employees in the region and transit is generally not viewed as a viable alternative. Many businesses see no issue in this state of affairs. However, some believe that transit is one ingredient within a broader agenda of “placemaking” that could be used to develop urban environments that are more attractive to young people (This view has also been set forth within the Region 2000 Comprehensive Economic Development Strategy process). There are particular sectors for which transit is of notable importance, namely the health care sector and higher education. Centra Health depends on transit for access to lower wage workers. Liberty University works with GLTC to provide transit services to its students. Given the considerable growth at the University, and the associated increase in land development and traffic, this partnership may increase in importance over time.

Outside Economic Forces: The region has recently been subject to employment losses and/or regional restructuring due to firm buyouts and consolidation trends. This type of job loss poses a challenge for the economic development community, as it is more influenced by a firm’s national or international corporate strategy than by any action or inaction by the region itself. Nevertheless, the pressure of such forces, along with economic trends affecting large sectors such as nuclear energy and traditional manufacturing, is encouraging many within the economic development community to think proactively about economic diversification, supporting entrepreneurial activity, and coordinated marketing and branding of the Lynchburg region.

5. SYNTHESIS OF KEY CHALLENGES, ASSETS AND OPPORTUNITIES

Drawing on the data-driven findings from Chapter 3 and the interview findings from Chapter 4, this chapter summarizes specific challenges, assets, and opportunities that characterize the Lynchburg regional economy and its current and emerging connectivity conditions. Each item is summarized succinctly and described in terms of its economic implications. Symbols are used to differentiate between constraints (🚫) and assets or Opportunities (🟢).

LABOR MARKET AND INTRA-REGIONAL CONNECTIVITY

🚫 *Limited labor market size*

Relative to selected peer regions (College Station, TX; Merced, CA; and Wilmington, NC), the Lynchburg region is characterized by a limited labor market size, as measured by the total population that is accessible within a 40-minute drive from the urban core. This limitation is a function primarily of dispersed settlement patterns in the Lynchburg region, rather than a function of performance limitations on the highway network.

In economic terms, larger labor markets enable more efficient matching between firms and desired candidate skills and limit search costs. With better matching, businesses achieve gains in overall productivity, making them more competitive. Firms like Georgia Pacific – Big Island have reported that while hourly positions are filled quickly, more advanced engineering positions can sometimes take longer to fill because the plant must recruit from outside the region.

🚫 *Skills gap, particularly in trades & STEM*

Related to labor market size is the quality of the local labor force and the availability of qualified workers. The Lynchburg region lags two of the three examined peer communities in educational attainment. In 2014, the share of the population over 25 with an associate's degree or higher was 32 percent in the Lynchburg region, compared with 39 percent in College Station and 43 percent in Wilmington.

Researchers continue to find that educational attainment is the strongest predictor of regional employment growth.⁸³ In interviews, multiple representatives of the business community reported that their firm has trouble filling certain positions for a lack of qualified applicants. Desired skills are concentrated in STEM fields and trades, including those that do not require a four-year college degree. Research shows that STEM jobs pay on average 10 percent higher than other jobs with similar educational requirements and that more STEM-oriented metropolitan economies perform better in the long-run in

⁸³ Literature supporting this notion is summarized in Edward Glaeser, *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*, London, UK: Penguin, 2012.

terms of job growth, employment rates, patenting, wages, and level of exports.⁸⁴ Much of Lynchburg's forecast employment growth in business services and health care will demand an educated workforce. Human capital is also significant in enabling technology adoption and associated labor productivity increases that facilitate continued growth in manufacturing output, despite employment losses.⁸⁵

🚫 Anticipated retirements and struggles to recruit young professionals

The Lynchburg region has struggled to attract and retain young professionals. From 1998-2013, the region's young adult population (18-34 years old) shrank by -0.9 percent.⁸⁶ In addition, regional stakeholders point to an anticipated wave of retirements in the near to mid-term future that is likely to exacerbate current workforce challenges.

There is growing evidence that businesses are choosing to locate in cities that appeal to young professionals. These cities tend to have vibrant urban cores and offer multiple transportation alternatives, while remaining affordable.

📍 Comparatively short/uncongested commutes

The Lynchburg region benefits from comparatively short uncongested commutes. The region's average commute, 22.9 minutes, is below the national average of 25.7 minutes. Interviewed stakeholders reported very few issues or bottlenecks on the regional road network and some even use short commutes as part of the package used to convince potential recruits from outside the region.

Virginia-specific survey data demonstrates that shorter commutes are directly related to a person's satisfaction with their trip to work.⁸⁷ A lack of congestion also helps companies and employees avoid the costs of "padding" schedules (i.e. adding in extra time to avoid being late) and means that employers do not have to pay a wage premium to compensate workers for overly long and costly commutes.

📍🚫 Downtown Lynchburg as an emerging but still limited regional urban core

Regional stakeholders report significant progress towards creating a vibrant and engaging downtown core in Lynchburg, citing examples such as the planned improvements to the Amazement Square Children's museum, current construction work on a new downtown hotel, and the successful Virginia HB2 (Smart Scale) funding application for a downtown circulator service vehicle. Nevertheless, many still believe that the image of the region to outsiders is of a relatively remote and not particularly dynamic region.

⁸⁴ Rothwell, Jonathan. The Hidden STEM Economy. Metropolitan Policy Program at Brookings.

⁸⁵ Simon 2004.

⁸⁶ U.S. Cluster Mapping Project

⁸⁷ Southeastern Institute of Research. DRPT's 2015 Virginia Statewide Travel Study: What It Means for Us and Our Elected Officials. As Presented by John W. Martin at VTA's 2016 Annual Conference on May 24, 2016.

<http://www.drpt.virginia.gov/media/1854/2015-state-of-travel-study-highlights-as-presented-by-sir-at-vta-conference-05-24-16.pdf>

The vibrancy of downtown Lynchburg is closely related by stakeholders to the region’s attractiveness to younger working professionals. This economic perspective is supported by broader national trends. One of the primary ways that regions attract skilled workers is by improving the appeal of their central cities. *The Young and Restless and the Nation’s Cities*, an influential report on the migration patterns of 25-34-year-olds with a college degree, finds that this demographic has a stronger observed preference for living in “close-in urban neighborhoods” than at any other time since 1980.⁸⁸

🚫 Limitations in transit accessibility and service

At present, total commute mode share for transit in the Lynchburg region is 1.4 percent. This reflects the minimal levels of transit service provided outside the City of Lynchburg. As stated in a recent statewide planning needs assessment, “due to the lack of inter-city transit options in the region...commuters using transit are restricted in their ability to reach regional jobs.”⁸⁹

Transit provides important access to employment and educational opportunities for regional residents who cannot or choose not to drive, for economic or other reasons. Some of the region’s major industries rely on transit for access to employees and customers, including the education, health care, and social assistance sectors. Transit is also one ingredient within a broader agenda of “placemaking” that could be used to develop urban environments that are more attractive to young people.

📍 Strong higher education presence

The Lynchburg region is home to six institutions of higher education: Central Virginia Community College, Liberty University, Lynchburg College, Randolph College, Virginia University of Lynchburg, and Sweet Briar College. Liberty University, in particular, has experienced rapid growth in recent years, contributing to overall population growth in the region.

Beyond providing a talented labor pool, universities benefit businesses by creating and transferring knowledge that can be commercialized, and these benefits grow with geographic proximity. This “ecosystem” approach generates positive economic impacts that often exceed those transpiring from research activities that take place in isolation.

INTER-REGIONAL CONNECTIVITY

📍 Amtrak service, particularly to Washington, DC

Since its introduction in 2009, Amtrak Virginia’s service extension from Lynchburg to Washington has played an important role improving both the functional and perceived integration of Lynchburg with major economic centers on the East Coast.

⁸⁸ <http://cityobservatory.org/wp-content/uploads/2014/10/YNR-Report-Final.pdf>

⁸⁹ VTrans 2040. VMTP 2025 Needs Assessment - Central Virginia Region.

http://www.vtrans.org/resources/vmtp_oct2015/DRAFT_Central_Virginia_Region_Needs_Profile_9_30_15.pdf

Offering travel times of just under four hours to DC and supplementing the existing long-distance Crescent corridor train, Amtrak Virginia benefits both the tourism economy and the business community in the Lynchburg region. Local experts and businesses report that Amtrak is an asset when recruiting new hires considering moving to the area; it helps to ameliorate perceptions of remoteness. The service also provides an affordable, reliable, and productive alternative to driving to DC, allowing businesses to avoid the cost of having staff tied up in traffic for “on-the-clock” travel. As service is further increased alongside the extension to Roanoke, there are opportunities to take further advantage of this asset.

Air service connectivity

As in many smaller regions across the country, air service connectivity in Lynchburg is both a challenge and an asset to be preserved. Lynchburg Regional Airport is served by one airline providing service to and from Charlotte. This level of connectivity is viewed by many as a limitation in the region, with some firms citing challenges with maintaining a broad network of national and international business connections. Nevertheless, the airport is an asset, offering advantages in terms of easy access and egress and the quality of the facilities provided, and has successfully managed to maintain and enhance commercial service over a period of significant consolidation in the airline industry as a whole.

Lynchburg Regional Airport and the services it supports have a number of economic implications. Air service offers businesses a means of connecting to the outside world, maintaining complex relationships with clients, suppliers, and collaborators across long distances. Businesses can achieve access to broad markets through air service while taking advantage of local assets (e.g. trained manufacturing workforce, cost-competitive land, and infrastructure, etc.). Research conducted for the Aviation Cooperative Research Program found that air connectivity has a strong positive relationship with regional economic productivity.⁹⁰ The airport also supports economic activity associated visitors who arrive by air. Finally, the airport itself serve as regional job center, supporting workers associated with commercial and general aviation activity, including Liberty University’s growing School of Aeronautics.

Lack of an interstate and both real and perceived remoteness

The Lynchburg region is served by two Virginia designated Corridor of Statewide Significance (US 29, US 460) and other key corridors (e.g. US 501) that provide access to the interstate network, but is not located directly on an interstate. According to stakeholders, this creates a perception of remoteness in the minds of those located outside the region, despite reliability and good levels of existing service on the region’s major highway corridors. Two of the other three peer regions examined in this study (College Station and Merced) also lack direct interstate access but have nevertheless achieved stronger long-term economic growth than has the Lynchburg region, indicating that interstate access is not a binding constraint. In addition, Lynchburg lags both College Station and Merced in the size of its same-day regional travel market (defined as employment accessible within a three-hour drive time), in large part due its geographic location at a distance from major cities.

⁹⁰ ACRP Report 132. The Role of U.S. Airports in the National Economy.
http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_rpt_132.pdf

According to regional experts (see Chapter 4), the lack of an interstate is a barrier when recruiting businesses from outside the region despite the availability of four-lane subdivided highways as interstate access is often viewed as a “check box” within the site selection process. Additional, limitations in one-day travel markets have implications for business competitiveness. Larger same-day travel markets unlock productivity gains from agglomeration economies, through a number of mechanisms including better matching between firms serving as both customers and suppliers, more cost effective management of supply chains and freight delivery, and increased potential for interaction and learning between firms.

📍 *Convergence of freight rail lines with no major capacity constraints*

Lynchburg lies at the crossroads of rail lines owned by two major Class I railroads: CSX and Norfolk Southern. While intermodal container traffic does pass *through* Lynchburg, all cargo originating from or destined for Lynchburg on rail is in the form of rail carload traffic, primarily bulk commodities. Norfolk Southern reports no major capacity constraints affecting rail in the region.

In terms of existing firm competitiveness, freight rail offers a cost-effective transportation option for regional manufacturing firms that make use of or produce relative low value-per-ton commodities. Looking forward, rail could make certain sites attractive to other similar firms. Any development would require close coordination with the Class I railroads.

DIGITAL CONNECTIVITY

📍 *Limited broadband in rural areas*

According to the 25 megabytes per second (mbps) download speed benchmark established by the Federal Communications Commission (FCC), urban areas within the Lynchburg region have relatively high download speeds while more rural outer areas in Bedford, Amherst, Appomattox, and Campbell county have low or no reported broadband coverage.

Quality broadband connectivity contributes increased productivity, competitiveness, and efficiency.⁹¹ Specific business functions that rely on high-speed Internet include marketing, data management, supply chain management, and cloud computing. The effects and value of broadband connectivity vary across different industries and can also be a function of complementary efforts such as workforce training.⁹² Broadband can also play an important supportive role in education.

📍 *Fiber-optic connections in the urban core*

While the Lynchburg region is already engaged in regional discussions focused on rural broadband limitations, less attention has been given to the value of existing fiber optic assets in the region. The

⁹¹ Appalachian Regional Commission, 2015, *Program Evaluation of the Appalachian Regional Commission's Telecommunications and Technology Projects: FY2004-FY2010*.

⁹² What works centre for local economic growth. Evidence Review: Broadband. March 2015.
http://www.whatworksgrowth.org/public/files/Policy_Reviews/15-03-10-Broadband-Summary.pdf

Lynchburg region has fiber optic network in parts of the urban core, and along major highway corridors (US 29 and US 460), offering download speeds that significantly exceed the FCC benchmark. High-speed broadband provided using technologies like fiber optic cable is particularly important for firms involved in collecting and analyzing large amounts of information (sometimes known as “big data”) to understand their markets and make strategic decisions.

6. STRATEGIES AND RECOMMENDED ACTIONS

Chapter 5 summarized challenges and opportunities facing the Lynchburg region with respect to transportation and digital connectivity. Building from those issues, this chapter presents specific actionable strategies. The strategies are structured into three categories: those addressing labor market access and intra-regional connectivity, those that deal with physical connectivity between Lynchburg and markets elsewhere, and those addressing digital connectivity. Within those categories, individual strategy areas are defined, and under each strategy area are specific proposed actions.

Strategies and actions were developed by examining peer region experience and strategies that have been successful elsewhere in Virginia and the U.S. They also build, wherever possible, on existing efforts in the Lynchburg region. Strategies are intentionally focused on physical connectivity and infrastructure. Other approaches, such as workforce training for example, are undoubtedly part of the equation for region economic success, but are addressed in other mutually supportive efforts like the parallel Comprehensive Economic Development Strategy (CEDS) process.

Each class of strategies is evaluated from an economic perspective. This evaluation paints a picture of what is at stake for the region in economic terms. There are two sets of representative highway projects that were more formally evaluated using the TREDIS economic evaluation tool in concert with the region's highway model. TREDIS is the most widely used system for economic impact analysis of transportation projects in the US and Canada.⁹³ For these bundles of projects, estimates of jobs, wages, income, and GRP impacts are reported. Other non-highway strategies are examined using the best available national research.

The chapter concludes with an implementation-oriented discussion, including consideration of next steps and roles and responsibilities. The strategies and actions presented here were reviewed by members of the Lynchburg Regional Transportation Advocacy Group (LRTAG) in a September 9, 2016 working session.

Where appropriate, callout boxes are used to note key initiatives from the CEDS process that are in direct alignment with the strategies and actions presented here. The final CEDS document also includes a general initiative (Key Initiative #8) that conveys support for the findings of this study: *Update project priorities and implement the region's existing plans for transportation, broadband, and other infrastructure provision based on relevant takeaways from the Central Virginia Connectivity Study.*⁹⁴

LABOR MARKET AND INTRA-REGIONAL CONNECTIVITY

The following strategy areas address both the quality of intra-regional travel and the attractiveness of the region to a quality labor force and to the employers seeking that talent: Placemaking, local bottlenecks, and transit and transportation demand management. The strategies respond to identified challenges in the Lynchburg region with access to labor, attracting and retaining young adults, and transit access, while

⁹³ For more information, visit: www.tredis.com

⁹⁴ Virginia's Region 2000. Comprehensive Economic Development Strategy (CEDS). November 2016.

working to preserve and enhance existing advantages associated with low levels of congestion and relatively short average commutes in the region.

Strategy Area 1: Placemaking

Strategy: Continue and enhance efforts to build an urban environment that is livable and appeals to younger workers and entrepreneurs. Focus on developing a community that is connected by quality pedestrian and bicycle infrastructure, with a strong sense of place. Work strengthen downtown Lynchburg an asset for the entire region by addressing issues such as wayfinding and intra-regional connectivity between activity centers (such as higher education, health, and the arts). Additionally, support placemaking enhancements in other local activity centers in the region.

Actions

A. Pursue implementation of Complete/Better streets projects as outlined in the Lynchburg Comprehensive Plan and the Central Virginia Long Range Transportation Plan.

The idea of a complete street is to develop streets that are welcoming, safe, and functional for all types of users, including people on foot, riding bicycles, using transit, or driving in cars. The Central Virginia MPO (CVMPO) 2040 Long Range Transportation Plan adopted in 2015 includes a set of projects addressing this goal that offer one roadmap for implementation (Figure 24).⁹⁵ This roadmap can be adapted as appropriate as the region engages in further planning activities. The City of Lynchburg has also defined a “Better Streets” policy for its Comprehensive Plan that aims to address similar objectives while emphasizing that Better Streets are context sensitive and integrating “Green Streets” concepts to help manage stormwater runoff and pollutants.⁹⁶ This is also consistent with the “walkability and placemaking needs to support the emerging workforce” identified for the Central Virginia MPO in the statewide VTrans needs assessment.⁹⁷ Complete/Better Streets can be achieved gradually over time, with individual jurisdictions identifying efficient opportunities for investment. An example put forth by the City of Lynchburg is the process of replacing water lines on city streets as an opportunity to restripe/repave according to Complete Streets / Better Streets standards.

⁹⁵ CVMPO. 2040 Long Range Transportation Plan (LRTP). <http://www.localgovernmentcouncil.org/transportation-planning/long-range-transportation-plan.html>

⁹⁶ City of Lynchburg. Memorandum: Better Streets Policy (Complete + Green Streets) for the Comprehensive Plan. 2013. <http://www.lynchburgva.gov/sites/default/files/COFILES/Community-Development/Planning-Commission/Better%20Streets%20Policy.pdf>

⁹⁷ Lynchburg District - DRAFT Consolidated 2025 VTrans Multimodal Transportation Plan Needs.

Figure 24 Complete-streets projects, CVMPO 2040 Long Range Transportation Plan

L RTP Project # (Rank)	Summary	Estimated Cost
# 95 (21)	Implement downtown Lynchburg complete streets.	\$50 M
# 93 (22)	Campbell Avenue, Edmund St to Florida Ave: roundabouts, road diet, rail to trail.	\$6.1 M
# 86 (31)	5th Street from Taylor St to the NS Rail Bridge: road reconstruction with added streetscape elements.	\$2.0 M
# 85 (40)	5th Street from Jackson to Taylor: Streetscape improvements	\$2.0 M

Source: CVMPO 2040 Long Range Transportation Plan.

B. Implement regional bike corridors - Continue to work towards implementation of the CVMPO Priority Accommodation Corridors as identified in the Region 2000 Bicycle Plan.

The Region 2000 Bicycle Plan defined a set of improvements for priority corridors that serve major destinations and are already in use by bicyclists in the region (Table 4-1 in the final report).⁹⁸ Strategies for those corridors include signage adjustments, restriping, and paving of shoulders to accommodate cyclists. Included in the set are improvements on Fort Avenue and the Wards Road corridor. These are particularly important from the perspective of intra-regional connectivity as they connect key centers of activity, including Liberty University, Central Virginia Community College, Lynchburg College, Kemper Street Station, and Downtown Lynchburg.

C. Improve wayfinding (on-line information and signage) to key activity centers in the region.

The objective of this action is to improve visitors’ and residents’ ability to connect with activities and resources in the region, to improve sense of place, and to better enable people to benefit from the region’s cultural and natural assets. Wayfinding improvements can include a combination of online information and physical signage to aid in navigation.

Other regions have developed smart-phone enabled tours using QR barcodes. QR codes are ways of embedding information into graphics and can be scanned by anyone with a smart phone and the appropriate application. The GRTagTour, for example, is smartphone-enabled one-mile tour of Downtown Grand Rapids, MI. The Grand Rapids Community Media Center in conjunction with the city’s Historical Commission and a local radio station produced the audio portions of the tour.⁹⁹ A scanable QR barcode at each stop along the tour links participants to a mobile website with location facts and nearby destinations of interest (Figure 25).

Similarly, the Hugman River Walk Tour in San Antonio, TX is a self-guided tour of the San Antonio River Walk.¹⁰⁰ QR barcodes link visitors to the mobile application and guide them along the River Walk. The barcodes are found on the River Walk’s wayfinding signs. The application guides visitors to 12 points of

⁹⁸ Region 2000 Bicycle Plan. Table 4.1, http://www.localgovernmentcouncil.org/images/12_10_PLA_region-2000-bike-plan_chapter4.pdf

⁹⁹ GRTag Tour. About the Project. <http://www.grtagtour.org/about.php> ; re: Streets. Case Studies: Grand Rapids. <http://www.restreets.org/case-studies/smart-apps-for-better-informed-wayfinding>

¹⁰⁰ City of San Antonio. Historic Hugman River Walk Tour. https://www.sanantonio.gov/portals/0/Files/HistoricPreservation/Hugman_Tour.pdf

interest along the tour and provides historical information, each stop marked by a bronze seal on a plaque. Multiple City of San Antonio departments (Downtown Operations, Convention & Visitors Bureau, Capital Improvement Management Services, and Historic Preservation Office) reviewed and identified the tour locations and approved the historical information. Local non-profit organizations including the Downtown Alliance and Centro San Antonio, which manages the downtown public improvement district, also participated in the design process. A local historian provided historical narrative. Historic photos were provided by the local historian, the San Antonio Conservation Society, and the Institute of Texan Cultures at the University of Texas at San Antonio. A local developer created the website, podcast and QR application.

Figure 25 GRTag Tour, Grand Rapids, MI



Source: GRTag Tour.¹⁰¹

¹⁰¹ Download from: http://www.grtagtour.org/locations.php?tour_id=1

Existing regional resources on which to build include the Lynchburg Regional Business Alliance metropolitan map and business directory,¹⁰² the Downtown Lynchburg google map of attractions,¹⁰³ the Discover Lynchburg online attractions interactive map,¹⁰⁴ the Ride Solutions bike map.¹⁰⁵ The region should consider the possibility of developing a single shared spatial database of attractions and routes. This digital resource could then be integrated with physical signage and informational materials developed to target specific markets by their most likely point of engagement, as shown in Table 12.

Table 12 Wayfinding target markets and relevant points of engagement.

Target Market	Relevant Points of Engagement
Outside visitors/tourists	Lynchburg Regional Airport, Kemper Street Station, the Lynchburg Visitor Information Center, and the Discover Lynchburg website. ¹⁰⁶
Potential residents and employers	Local government offices and websites, Lynchburg Regional Business Alliance website, the Lynchburg Realtors Association website and realtor offices.
Students	College and university websites, student centers, student orientation and campus tours, welcome packages, and recruitment material.
Regional residents	Discover Lynchburg website, Lynchburg Life website, local newspapers.

Source: EDR Group analysis.

D. Coordinate improved multimodal connectivity between institutions of higher education and downtown Lynchburg.

Lynchburg’s downtown will benefit from stronger connections with regional colleges and universities. GLTC’s upcoming Transit Development Plan (TDP) provides a formal opportunity to begin this conversation. Cities with strong physical and perceived connections between their urban core and college campuses often embody key elements of quality places, including walkability, sidewalk amenities, a mix of building uses, and feelings of safety and liveliness.¹⁰⁷

The physical and psychological distance between some of Lynchburg’s colleges and its downtown limits the city’s ability to generate the pedestrian and business activity that comes from university-downtown colocation. None of Lynchburg’s colleges or universities are within a half-hour walk from downtown (Table 13). Among Lynchburg’s peer regions, Merced’s situation is most similar because both Merced College

¹⁰² Accessible from: <http://www.lyncburgregion.org/pages/regional-maps>

¹⁰³ Accessible from: <http://www.downtownlynchburg.com/>

¹⁰⁴ Accessible from: <http://www.lyncburgvirginia.org/about-lynchburg/maps-transportation/>

¹⁰⁵ <http://ridesolutions.org/commuters/bike-walk/bike-map/>

¹⁰⁶ <http://www.discoverlynchburg.org/>

¹⁰⁷ Michigan State University Land Policy Institute, *Placemaking as an Economic Development Tool* (East Lansing, MI: Michigan State University, 2015).

and the University of California, Merced (UC Merced) are located several miles from the city’s downtown. College Station is different, with Texas A&M University anchoring the city’s downtown (although the university is 4.9 miles from neighboring Bryan). In Wilmington, the University of North Carolina is not within walking distance but Cape Fear Community College is.

Table 13. College/University Accessibility from Downtown in Lynchburg and its Peer Regions

Region	College/University	To-From Downtown			
		Driving Distance	Bus/Shuttle Service	Walkable (30-minute walk or less)	Bike Lane/Trail
Lynchburg, VA	Virginia University of Lynchburg	2.3 miles	N	N	Y
	Randolph College	2.7 miles	Y	N	Y
	Lynchburg College	3.5 miles	Y	N	N
	Liberty University	5.7 miles	Y	N	N
	Central Virginia Community College	6.1 miles	Y	N	N
	Sweet Briar College	12.8 miles	N	N	N
College Station, TX	Texas A&M University	<1 mile	Y	Y	Y
Merced, CA	Merced College	2.4 miles	Y	N	Y
	University of California, Merced	7 miles	Y	N	Y
Wilmington, NC	Cape Fear Community College	1.1 miles	Y	Y	N
	University of North Carolina Wilmington	5.1 miles	Y	N	N

Source: Google Maps; <https://www.cityofmerced.org/civicax/filebank/blobdload.aspx?BlobID=7111> for Merced bike lanes.

Through focused corridor planning, the seeming isolation of places like UC Merced that are several miles away from the urban core can be addressed. UC Merced adopted this very strategy through a collaborative effort with the city, focusing on strengthening the corridor just outside the university and connecting it in to existing north-south arterials that link with the downtown area. This included a goal of developing a “transit spine.”

Merced is focused specifically on facilitating tech transfer at its expanding University of California campus. The Bellevue Community Plan “provides a long-range vision and strategies that link mobility, innovation districts, diverse housing, open space amenities, retail, and entertainment.”¹⁰⁸ This effort germinated from a goal of “providing significant employment generating uses that would benefit from being in close proximity to the UC Merced campus.”¹⁰⁹ The university itself was involved in the planning process as one of several area stakeholders, and students contributed to the plan through research on “potential university spin-off growth, and attracting entrepreneurs through site design and other methods.”¹¹⁰

¹⁰⁸ American Planning Association, Innovation District: Gateway to UC Merced, <https://www.planning.org/events/nationalconferenceactivity/9002264/>

¹⁰⁹ City of Merced, Bellevue Community Plan, <https://www.cityofmerced.org/civicax/filebank/blobdload.aspx?BlobID=13564>

¹¹⁰ Other stakeholders included the Merced County Association of Governments (MCAG), Merced County, Merced/Mariposa County Asthma Coalition, Merced Bicycle Coalition, Merced County Department of Public Health, property owners, and developers. See <https://www.cityofmerced.org/civicax/filebank/blobdload.aspx?BlobID=11569> for more information.

Lynchburg should consider embarking on an effort similar to the Bellevue Community Plan because, like Liberty University, UC Merced is expanding in an area that could benefit from improved street connectivity, additional forms of mobility, and placemaking through urban design. In physical terms, the plan calls for a “transit spine” that will help spur development of research and development space within walking distance to the university. Additionally, while Lynchburg’s existing bus service is commensurate with its peers, with subsidized routes connecting downtown with local campuses, the city could also benefit by working with surrounding campuses to pursue Bicycle Friendly UniversitySM designation like some colleges in peer regions have done.¹¹¹ Further enhancements in transit service frequency could also be of value, in concert with demand-side transit strategies discussed under Strategy Area 2.

E. Consider a bikesharing program that connects with transit and passenger rail and could be used to reduce the need for parking and short auto trips by students, residents, visitors and workers.

F. Explore Parking Strategies.

Alignment with initiatives in the Comprehensive Economic Development Strategy (CEDS):

The following initiatives have been defined through the Region 2000 CEDS process and are directly related to the placemaking strategy area of this connectivity study.¹¹² These initiatives represent specific project ideas that fall within a broader umbrella of placemaking. Within the CEDS, they are grouped under Goal V, “supporting the vitality of our diverse communities and downtowns.”

KEY INITIATIVE #10 - Advance a Regional Riverfront Vision that seeks to “unlock” the region’s riverfronts, better connecting and integrating local communities with the James, Roanoke, and Staunton Rivers.

KEY INITIATIVE #11 - Expand the establishment of Arts and Culture Districts throughout the region to encourage and incentivize projects that improve the aesthetic, artistic, and cultural appeal of the region.

Potential Economic Gains

Placemaking strategies have real economic implications for regional competitiveness. Research shows that vibrant urban areas help attract and retain the well-educated workers who help raise a region’s

¹¹¹ Lynchburg College, Riding the Bus, <http://www.lynchburg.edu/student-life/housing/riding-the-bus/>; Texas A&M is a bronze-level Bicycle Friendly UniversitySM, meaning the university promotes bicycling in five key areas established by the League of American Bicyclists: engineering, encouragement, education, enforcement, and evaluation/planning. The University of North Carolina Wilmington is also a bronze Bicycle Friendly UniversitySM. <https://www.liberty.edu/onecard/index.cfm?PID=33914>

¹¹² Virginia’s Region 2000. Comprehensive Economic Development Strategy (CEDS). November 2016.

overall educational attainment—the strongest predictor of future employment growth.¹¹³ Additionally, walkability and transit accessibility can increase property values and foot traffic for street-level businesses, resulting in more sales and the spin-off effects generated when employees spend their wages elsewhere in the local economy.¹¹⁴

Strategy Area 2: Local Bottlenecks

Strategy: Focus on maintaining and enhancing the outstanding reliability of the network in the region. Invest strategically to preserve performance on the region’s road network, continuing to support quality intra-regional travel. Target intra-regional transportation bottlenecks and work to ensure patterns of growth do not erode the current quality of commuting in the region.

Actions

G. Pursue funding of significant improvements that would relieve bottlenecks on corridors serving commuter flows and regional activity centers.

The corridor improvements listed in Table 14 were identified from the unconstrained or “Vision” project list in the current regional long range transportation plan (LRTP)¹¹⁵ and from a list of submitted but currently unfunded Smart Scale projects.¹¹⁶ These projects are selected based on their anticipated role in addressing current or emerging localized bottlenecks in the region affecting intra-regional travel patterns. Preference is given to projects serving major activity centers, facilities already experiencing congestion, and to projects that ranked relatively highly within the LRTP. These improvements represent the types of investments that could be made with additional funding, above a constrained scenario based on estimates of future state and local transportation funding sources through year 2040.

It is important to note that these project definitions derived from specific available planning documents. Regional transportation planning is an ongoing and cyclical process and therefore the exact parameters of desired investments on key corridors may evolve over time as projects are moved from long-range sketch-level planning to more detailed engineering and operational analyses. For example, certain projects that are defined as widening projects in the current LRTP may evolve to focus on alternative congestion mitigation strategies such as access management. There is, in fact, a corridor study already underway for Candler Mountain Road between US 460 and Wards Road addressing safety and congestion

¹¹³ Southeastern Institute of Research. DRPT’s 2015 Virginia Statewide Travel Study: What It Means for Us and Our Elected Officials. As Presented by John W. Martin at VTA’s 2016 Annual Conference on May 24, 2016; literature supporting the notion that educational attainment leads to employment growth is summarized in Edward Glaeser, *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*, London, UK: Penguin, 2012.

¹¹⁴ Michigan State University Land Policy Institute, *Placemaking as an Economic Development Tool* (East Lansing, MI: Michigan State University, 2015).

¹¹⁵ CVMPO. 2040 Long Range Transportation Plan (LRTP). <http://www.localgovernmentcouncil.org/transportation-planning/long-range-transportation-plan.html>

¹¹⁶ Virginia Smart Scale. Projects. <http://vasmartscale.org/projects/> (FY2017)

issues as part of the VDOT STARS (Strategically Targeted Affordable Roadway Solutions) Program. The objective of the program is to “identify cost-effective measures aimed at improving safety and reducing congestion” based on a multidiscipline approach.¹¹⁷

Table 14 Intra-regional roadway improvements identified from existing planning efforts

Project	Notes	Cost
Route 622, Lynbrook Road* (Smart Scale Submission)	Reconstruction from US 29 to Lawyers Road – improve alignment and widen; commuter alternative to US 460 and US 29, serving local commuter patterns and alleviating traffic.	\$9.5 M
Candlers Mountain Road (US 501) Improvement (LRTP #91, rank 6)	Capacity, operations, and safety improvement from US 460 to US 29; connects local businesses to major highways; also a primary commuter corridor with congestion. Defined in the LRTP as a widening to 6 lanes.	\$23.1 M
South Amhest Hwy (BUS 29)/ Rt 163 Interchange (LRTP #31, rank 12)	Add ramp to complete interchange; primary commuter corridor with congestion.	\$ 12.0 M
Lakeside Drive (221) Improvement (LRTP #88, rank 14)	Capacity improvement from Rt 501 to Forest Brook Road; commuter corridor with forecast congestion. Defined in the LRTP as a widening to 4 lanes.	\$19.2 M
Candlers Mountain Road (Rt 670) Improvement (LRTP #94, rank 25)	Capacity improvement from Mayflower Drive to US 460; addresses congestion around major local activity center. Defined in the LRTP as a widening to 4 lanes.	\$17.3 M
TOTAL – Intra-regional project set:		\$81.1 M

Source: *Smart Scale Project Application; All other projects from the 2040 LRTP Unconstrained (Vision) Plan.

Potential Economic Gains

The projects listed in Table 14 were modelled in the region’s travel demand model, generating estimates of transportation system performance improvements in 2040 relative to a fiscally constrained pattern of investment.¹¹⁸ This modelling exercise produces forecasts of improvements in transportation system performance, including reductions in vehicle hours traveled, reductions in the proportion of traffic experiencing stop-and-go congested conditions, and mileage savings that result when drivers are able to stop avoiding bottlenecks on the network (Table 15). Congestion effects are important over and above travel time savings because they reduce the need to buffer travel time to ensure on-time-arrival and

¹¹⁷ VDOT. STARS. http://virginiadot.org/projects/stars_ii.asp

¹¹⁸ The baseline scenario included construction of the LRTP Financially Constrained 2040 Project List, currently funded Smart Scale projects (#529, 528, and 681, FY2017), and recently initiated projects in the vicinity of Liberty University that are all anticipated to be completed by 2040. Guidance on baseline scenario definition was provided by the VDOT Lynchburg District Office and the Region 2000 Local Government Council. The modelling assumed a 7-year construction period, a 35-year analysis period, and was run using the assignment routine, only (i.e. assumed no major trip distribution would be caused by the projects).

reduce vehicle operating costs associated with stop-and-go traffic. Results of the travel model runs also show a small increase (0.14%) in the size of the labor market that is accessible from the Lynchburg central business district.

Table 15 Travel performance effects of modelled intra-regional project bundle

Reduction / Savings in 2040	Passenger Cars	Trucks (Freight)
Gross Vehicle-Miles Traveled	77,811	48,615
Gross Vehicle-Hours Traveled	51,744	11,775
Gross Buffer Time (Hours)	24,445	8,970
Passenger Miles	93,374	-
Freight US Ton Miles	-	302,580

Source: Lynchburg Travel Model; Analysis by Michael Baker International.

The TREDIS economic model enables a translation of performance changes into estimates of resulting economic growth, as shown in Table 16. Three types of effects are reported:

- **Construction Impacts** are short term impacts associated with spending on materials and labor in the course of project construction (also sometimes called stimulus effects);
- **Operational Impacts** are associated with reductions in vehicle operating costs, reduced travel time, and decreased congestion.
- **Labor Market Impacts** are associated with improved business productivity due to the ability to access a wider pool of qualified workers.
- All reported economic impacts include multiplier effects associated with increased supplier purchases and recirculation of worker income as it is spent at local businesses.

Table 16 Economic impact of modelled intra-regional project bundle

Year	Business Sales (\$M's)	Value Added (\$M's)	Jobs	Wage Income (\$M's)
Short Term Cumulative Effects (2016-2022)			Avg. Annual	
Construction	\$95	\$50	100	\$42
Long Term Cumulative Effects (2018-2050)			In 2050	
Operational	\$55	\$25	15	\$16
Labor Market	\$85	\$52	33	\$31
<i>Total</i>	<i>\$141</i>	<i>\$77</i>	<i>48</i>	<i>\$47</i>
Effects in Future Years:				
In Year 2050	\$5.2	\$2.9	48	\$1.8

Source: TREDIS; EDR Group Analysis.

Cumulative long term impacts out to the year 2050 would reach approximately \$140 million in additional business sales. By 2050, 48 new jobs would be added in the economy. The moderate scale of the impacts

reflects both the tactical nature of the modeled projects, and the relatively built-out and uncongested nature of the highway system in the Lynchburg region.

Strategy Area 3: Transit and Transportation Demand Management (TDM)

Strategy: Build support and demand for transit and alternative transportation options by encouraging collaborative communication and problem-solving between major employers, regional commuters, and transit operators. Continue to build on the RIDE Solutions platform, increasing awareness of alternative transportation options and programs. Seek creative solutions that will make transit and other alternative transportation options (ridesharing, biking, walking) attractive and feasible.

Actions

H. Enhance outreach to the business community through partnerships between RIDE Solutions, the Region 2000 Workforce Development Board, and the LRBA (Lynchburg Regional Business Alliance).

RIDE Solutions is a Transportation Demand Management (TDM) Agency serving the greater New River and Roanoke Valleys and Region 2000 regions of southwestern Virginia. Grant-funded by the Virginia Department of Rail and Public Transportation and participating regional governments (including the Region 2000 Local Government Council), the organization works with community members and businesses to encourage commuting options beyond reliance on single-occupancy vehicles.¹¹⁹ In regions like Lynchburg, where the automobile remains the dominant mode of movement, demand-side efforts help to gradually build the critical mass required to support ongoing and increasing investment in transit services, ride-sharing, and bicycle and pedestrian infrastructure.

TDM activities are most successful when they involve close partnerships with the business community and when businesses and local governments jointly understand workforce accessibility as an issue closely related to economic competitiveness. Both the Region 2000 Workforce Development Board (WDB) and the Lynchburg Regional Business Alliance (LRBA) are in unique positions to support RIDE Solutions. Recent participation by Megan Lucas, CEO & Chief Economic Development Officer of the LRBA, and Ben Bowman, Workforce Development Director for the Region 2000 WDB, in a RideSolutions promotional video is just one example of collaboration upon which the region can build.¹²⁰ GLTC's 2017 update of the Transit Development Plan also provides an opportunity to jointly consider service enhancements and expansions throughout the region.

I. Consider implementation of an activity-based commuter rewards program.

Commuter rewards programs are a way to increase the attractiveness of transit, ridesharing, and other alternative transportation options. In considering this option, the Lynchburg region can look to examples from other parts of Virginia. Northern Virginia and the Hampton Roads region participate in the NuRide commuter rewards program which provides rewards for walking, biking, telecommuting, ridesharing, and

¹¹⁹ RideSolutions. About Us. <http://ridesolutions.org/about-us/>

¹²⁰ RIDE Solutions: Serving Central and Southwest Virginia. April 2016. <https://youtu.be/8-h2nApCGdI>

use of transit. Users track their trip-making in an online account and earn points. Points can then be redeemed for restaurant coupons, retailer discounts, and tickets to shows and attractions.¹²¹ Local and national companies serve as sponsors offering rewards.¹²² In 2013, the NuRide program tracked a reduction of nearly 10 million regional vehicle-miles travelled.¹²³

J. Work with GLTC (Greater Lynchburg Transit Company) and major regional employers and educational institutions to support a unified transit pass program.

Transit pass programs are designed to make transit use as easy and seamless as possible and to offer the option for businesses and institutions to subsidize transit usage by employees and students. They have been successfully adopted elsewhere in Virginia: The GoPass365, offered by Hampton Roads Transit (HRT), is a yearly discounted transit pass available to businesses and educational institutions for purchase. The passes are available under two pricing options: a) per-swipe, where participating organizations buy passes for a nominal up-front fee and then pay HRT on a per-swipe basis for recorded user transactions; and b) per pass flat-rate, where organizations pay a lump sum per pass (tiered by number of users) that then enables unlimited usage by participants. The GoPass365 program gives participating entities the ability to supplement employees' and students' transportation costs.¹²⁴ It also provides a platform for communication and creative problem solving between major employers and the transit agency, addressing issues such as stop location and schedule adjustments to better match commuter needs.

Participants in the Hampton Roads region include universities and colleges, health care providers, and Downtown Norfolk Council Consortium. The local community college is the largest single user and feels that transit access is imperative to ensuring students with limited resources are able access educational opportunities.¹²⁵ Hampton Roads Transit reports that the program is particularly important for attracting "young, professional, and blue collar choice riders" to the transit system.¹²⁶

The Lynchburg region already has the foundations of a unified transit pass program in the form of individual agreements with institutions of higher education. Current efforts could be expanded to a broader pool of potential users, looking beyond students and existing riders to build sustainable demand for transit services.

¹²¹ NuRide. <https://www.nuride.com/>

¹²² Shapiro, Carolyn. Farm Fresh joins 'green' rewards program. The Virginian-Pilot, January 2010. http://pilotonline.com/news/local/transportation/farm-fresh-joins-green-rewards-program/article_cd565724-5c33-5c6d-a0ec-9e258521879b.html

¹²³ Hampton Roads Transit. TRAFFIX Annual Report Fiscal Year 2013. <https://www.epa.gov/sites/production/files/2016-02/documents/update18.pdf>

¹²⁴ GoPass365. About. <http://gopass365.com/about/>

¹²⁵ EDR Group. The Economic and Societal Impact of Hampton Roads Transit. http://www.connecthamptonroads.com/pdf/HRT_Economic_Impact_23_June_Final.pdf

¹²⁶ Hampton Roads Transit. TRAFFIX Annual Report Fiscal Year 2013.

K. Promote statewide vanpooling efforts – VanpoolVA! - Investigate opportunities for the region to benefit from DRPT's emphasis on expanding vanpooling in rural and small urban areas across the state.

Looking beyond transit services provided in the region's urban core, vanpooling is one approach to providing transit-like access in rural areas that cannot support fixed-route transit services. Virginia's Department of Rail and Public Transportation has recently announced a goal of seeing an increase in vanpools across the State. The agency is at present in the early planning stages for this initiative, but expects to have a program outlined in early 2017.¹²⁷ Given challenges to traditional transit service in more rural areas, this could be an important opportunity for the Lynchburg region.

L. Encourage and incentivize employers to provide transit and vanpool pass/fare and biking benefits to employees in accordance with IRS eligibility rules.

Potential Economic Gains

Potential economic gains in this strategy area relate to both the locational preferences of the young educated workforce and thus the companies that tend to follow them, and the role that transit plays in ensuring those with fewer resources can access employment—particularly in some of the region's larger industry sectors like health care. A 2014 survey conducted by Global Strategy Group for the Rockefeller Foundation and Transportation for America found that “80 percent of Millennials say it's important to have a wide range of options, and over half of Millennials surveyed (54 percent) would consider moving to another city if it offered a wider, better range of options for getting around.” Corporations are in turn following their desired workforce into places served by transit. Recent high profile examples of this include General Electric in Boston, McDonald's and Motorola in Chicago,¹²⁸ and ADP in Norfolk, Virginia.¹²⁹ Transit also can play a role in facilitating efficient spatial clustering of the type preferred by knowledge economy industries, including start-ups and venture capital firms.¹³⁰ Transit provides access to labor for major industries in the Lynchburg regional economy. Forty percent of current transit commuters in the region

¹²⁷ Kelly Hitchcock, Senior Planner, Virginia's Region 2000 Local Government Council.

¹²⁸ Schwartz, Nelson D. Why Corporate America Is Leaving the Suburbs for the City. The New York Times, August 2016. <http://www.nytimes.com/2016/08/02/business/economy/why-corporate-america-is-leaving-the-suburbs-for-the-city.html>

¹²⁹ Hartley, Eric and Elisha Sauers. “ADP says it will hire mostly locals for 1,800 jobs in downtown Norfolk.” The Virginian Pilot. 2016. http://pilotonline.com/business/jobs/adp-to-hire-mostly-locals-for-jobs-in-downtown-norfolk/article_091af4e5-16ae-5e5c-aaf0-a343778c05b0.html

¹³⁰ APTA. The Role of Transit in Support of High Growth Business Clusters in the U.S. <https://www.apta.com/resources/reportsandpublications/Documents/TransitHighGrowthClustersUS-Final2013-1124.pdf>; APTA. Public Transportation's Role in the Knowledge Economy. <https://www.apta.com/resources/reportsandpublications/Documents/APTA-PT-Knowledge-Economy.pdf>; Martin Prosperity Institute. VENTURE CAPITAL GOES URBAN: Tracking Venture Capital Investment and Startup Activity across U.S. Zip Codes. http://martinprosperity.org/media/Startup-US-2016_Venture-Capital-Goes-Urban.pdf

work in education, health care, and social assistance.¹³¹ Finally, transportation can be a significant barrier for those seeking post-secondary education, and transit provides affordable transportation alternatives that can help ensure students are equipped with the skills to participate in the broader economy.

INTER-REGIONAL CONNECTIVITY

Inter-regional connectivity strategies are presented for the following areas: Intercity passenger rail, air service development, access on key highway corridors, and cargo-oriented development. Many of these strategies will depend on partnerships between different public sector organizations in Lynchburg, between the region and private sector actors, or between the region and other state-level efforts.

Strategy Area 4: Intercity Passenger Rail

Strategy: Enhance Lynchburg's role as a passenger rail hub for the region. Continue to build off the demonstrated success with Amtrak services to and from Lynchburg through marketing, planning, and advocacy efforts.

Actions

M. Coordinate and enhance marketing of Amtrak services. Coordinate online tourism marketing with regional tourist destinations.

Regional stakeholders view Amtrak service to Lynchburg as a success story and asset that could be more effectively leveraged to support tourism, local business travelers, and aid in recruitment of young professionals that prioritize access to major urban centers when considering potential relocation. With the soon-to-be-realized extension to Roanoke and increased service frequencies, now is the perfect time to enhance the image of Lynchburg as rail-accessible.

Existing efforts in the region include the advertisements placed by the City of Lynchburg in magazines offered on trains and the information on Amtrak access included on the Discover Lynchburg website. There are further opportunities for state-level marketing efforts, in cooperation with DRPT and Amtrak, as well as the Commonwealth Transportation Board Rail Subcommittee. The state of Maine offers a particularly good example of best practice in this area. The Train to Maine campaign and website (TrainToMaine.com) is a promotional and marketing strategy deployed by the Northern New England Passenger Rail Authority (NNEPRA) to increase Downeaster Amtrak service ridership and stimulate tourism.¹³² NNEPRA is a public transportation authority established in 1995 in Maine to develop passenger rail service within Maine and between Maine and Boston, MA.¹³³ The Train to Maine campaign showcases communities along the rail line as accessible tourism destinations, highlighting points of interest around

¹³¹ American Community Survey, 2014 5-year estimate.

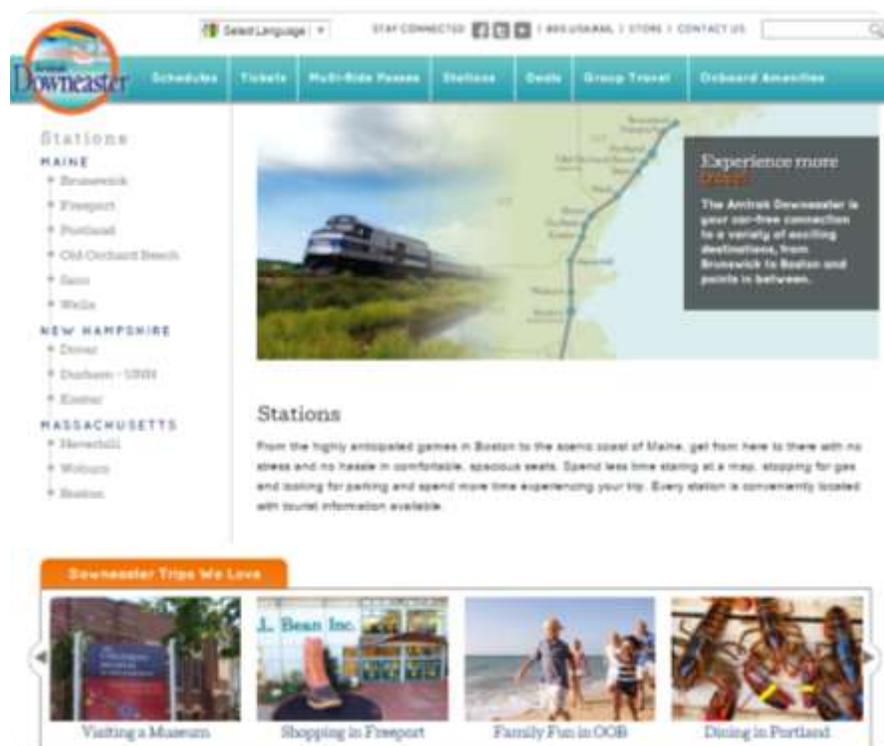
¹³² NNEPRA. Promotion.

http://www.nnepra.com/sites/default/files/content/images/Promotion_NNEPRA_Brochure_2013.pdf

¹³³ NNEPRA. About. <http://www.nnepra.com/about>

each station and providing information for travelers on connectivity transportation services (Figure 26). While the Amtrak Virginia website does include a list of some rail accessible attractions in the Commonwealth, the database at present is limited in scope and does not include any destinations in the Lynchburg region.¹³⁴

Figure 26 Train to Maine Website



Source: Traintomaine.com

N. Advocate for reliability and connectivity - Participate in state and multi-state efforts to improve on-time performance of trains and long-term planning to increase rail connectivity, including consideration of capacity constraints.

To enhance Lynchburg Lynchburg’s role as a passenger rail hub for the region requires a focus on both service reliability improvements, in the shorter term, and on long-term efforts to enhance connectivity and address bottlenecks. Reliability is an important issue for rail attractiveness relative to other modes. Additional capacity and track access are being studied at the federal and state level to address constraints that limit the potential for passenger rail service improvements and expansion in Virginia.

¹³⁴ Amtrak Virginia. Where We Go. <https://www.amtrak.com/virginia/traveling-with-amtrak-in-virginia>

Currently, the service between Lynchburg, VA and Washington operates at approximately 50 mph. In contrast, regional rail service between Washington, DC and Philadelphia operates at an effective speed of 70 mph (approximated based on network mileage represented in GIS¹³⁵ and Amtrak timetables). If trains to and from Lynchburg on the existing rail network were able to operate at the higher DC-Philadelphia speeds, Charlotte, Richmond, and DC would all be reachable in less than three hours by train, as shown in Table 17. The three-hour travel time threshold is a target for enabling easy one-day return travel, a particularly important objective for business connectivity. Lynchburg Amtrak passengers currently travel to Richmond via a bus connection in Charlottesville. The DRPT 2013 Rail Plan include a vision for full passenger rail connectivity to Richmond, following the existing freight railroad network (defined as Phase VI of the long-range plan for the US 29, 460 & I-81 Corridor).¹³⁶ The plan is estimated to require \$24.5 million (2012 dollars) in capacity improvements. In addition, North Carolina DOT has recommended study of the Lynchburg-Charlotte passenger rail corridor (currently serviced by the Crescent service), investigating the potential to extend Amtrak Northeast Regional passenger train from Lynchburg south.¹³⁷ Preliminary estimates put the capital costs of this proposal at \$35.6 million (2014 dollars).

The region should stay abreast of these and related planning efforts, alongside general advocacy for improved reliability, added frequency, and improved travel times. The Commonwealth Transportation Board Rail Subcommittee along with DRPT are necessary partners in this effort.

Table 17 Target Three-Hour Rail Connections

Connection	Travel Time Rail	Travel Time Drive	Approx. Network Distance (mi)	Approx. Effective Speed (mph)	Approx. Speed to Achieve 3-hr Travel Time	Approx. Travel Time at 73 mph
Lynchburg to DC	3:42	3:30	181	49	60	2:30
Lynchburg to Charlotte	4:14	3:30	202	48	67	2:45
Lynchburg to Richmond	3:54	2:15	(Rail to bus currently)	(Rail to bus currently)	41	1:40
DC to Philadelphia (Acela)	1:39	2:30	141	85	-	
DC to Philadelphia (Regional)	1:56	2:30	141	73	-	

Source: EDRG Group Analysis, from Amtrak timetables and National Transit Atlas Database rail network shapefiles.

¹³⁵ National Transportation Atlas Database. Railway Network.

http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/2012/index.html

¹³⁶ DRPT. 2013 Virginia Statewide Rail Plan. US 29, US 460, and I-81 Passenger Service (pg. 5-13).

<http://www.drpt.virginia.gov/media/1135/vsrp-2013.pdf>

¹³⁷ NCDOT Rail Division. Comprehensive State Rail Plan. August 2015.

<https://connect.ncdot.gov/resources/RailPoliciesDocument/2015%20Comprehensive%20State%20Rail%20Plan-%20Full%20Report.pdf>

- O. Support DRPT's reporting of Amtrak's on time performance through more visible, graphically-oriented website.***
- P. Engage with DRPT to offer guidance to Statewide Rail Plan for future station planning and rail capacity around stations.***

Potential Economic Gains

The economic logic for focusing on rail access is two-fold: First, rail is valuable to regional tourism, particularly for some of the northern urban markets where people may not own cars. Second, Amtrak services already offer convenient reliable connections to business travelers and this access could be further enhanced to enable reliable one-day-return travel and increase Lynchburg's economic integration with other major east coast economies.

If rail connections to DC and Charlotte achieved 70 mph operating speeds, the economic activity accessible from Lynchburg within 3 hours by car or rail would increase by about 20 percent (from 3.7 million in accessible employment to 4.4 million), mostly in the DC market. A traveler arriving in DC after a 2.5-hour train trip (as estimated in Table 17) would have a half hour of travel time remaining before reaching the three-hour threshold. With all of the local transit services connecting at Union Station in DC, the economic activity reachable within a half hour by transit is considerable, amounting to approximately 700,000 employees.¹³⁸

Strategy Area 5: Air Service Development

Strategy: Consolidate regional support for the air service development activities managed by the Lynchburg Regional Airport (LYH), focusing on a three-tiered strategy of: 1) Maintain current service levels, 2) Enhance service through equipment upgrades and efforts to expand capacity and service reliability, and 3) Expand commercial air service, targeting major carrier hubs (e.g. Dulles, Chicago, Philadelphia), and potential tourism niche markets (e.g. Orlando, via Allegiant Air). This strategy mirrors the approach set forth in the Lynchburg Regional Airport's Air Service Development Strategic Plan. The first order of business for small regional airports is always to maintain demand and service levels by sustaining close relationships with airlines and demonstrating market strength. Second, airport managers work to gradually advocate for enhanced service with commercial airlines, based on demonstrated success—full planes, for example. The recent return of jet service to LYH falls in this category. And finally, there are continual efforts to convince airlines to expand into new markets.

Actions

- Q. Coordinate a regional narrative on the value of LYH relative to other alternatives (e.g. driving, using other airports).***

¹³⁸ Owen, Andrew; Levinson, David M. (2014). Access Across America: Transit 2014 Data. Retrieved from the Data Repository for the University of Minnesota, <http://dx.doi.org/10.13020/D6MW2Q>

Because airlines respond to demonstrated local demand, an important first step is always bolstering the market for LYH. The airport itself is engaged in marketing, including the “Check Lynchburg First” campaign and its website statement that “Only Lynchburg Regional Airport brings you directly into Region 2000, a 2000-square-mile district in the heart of Virginia.”¹³⁹ Experience in peer regions shows that there may be a place for other regional organizations to provide reciprocal marketing and build a coordinated narrative that highlights the competitive advantages of small airports. For example, Easterwood Airport in College Station, TX prominently links to other organizations that provide information on points of interest and activities within the community. These include the website maintained by the Bryan College Station Convention and Visitors Bureau and the Research Valley Partnership, a regional economic development partnership aimed at connecting industry and research activity at Texas A&M university. These organizations in turn market Easterwood Airport, as shown in Figure 27. The airport in Merced, CA also provides a good example of describing the specific competitive advantages of a small airport, stating that “The Merced Regional Airport/Macready Field (MCE) offers a short commute, free parking, simple check-in, no long lines and professional TSA baggage inspection services. Departing from here is easy!”¹⁴⁰ Other organizations in the Lynchburg region, including the LRBA, can support existing marketing efforts at LYH by presenting similar narratives and information across relevant informational websites. The region might consider using coordinated slogans or visuals already developed by LYH, or working collaboratively to refine a story about the airport as a convenient and competitive regional asset.

Figure 27 Reciprocal Airport Marketing – College Station, TX



¹³⁹ Lynchburg Regional Airport. <http://www.lynchburgva.gov/airport>

¹⁴⁰ Merced Regional Airport. <http://flymercedairport.com/>

Source: EDR Group, images from Easterwood Airport,¹⁴¹ Bryan College Station Convention and Visitors Bureau,¹⁴² and Research Valley Partnership websites.¹⁴³

R. Advocate for service to Dulles in coordination with the 2017-2018 \$50 million incentive program to reduce the cost per enplanement at Dulles and thus support expansion of the hub. Investigate opportunities to collaborate with Newport News, the other Virginia airport without direct service to Dulles. Coordinate a region-wide conversation regarding potential startup incentives for United Airlines service to Dulles.

The Commonwealth of Virginia is investing \$50 million over two years (2017-2018) in Dulles International Airport. This investment is expected to result in a 33 percent reduction in cost-per-enplanement, a metric used by airlines to measure the cost of operating out of a particular airport.¹⁴⁴ The investment is intended to help make the airport more competitive and to help it attract and retain commercial air carriers and service.¹⁴⁵ This presents an opportunity for state-level advocacy for new connections at the two current Virginia airports without service to Dulles: Lynchburg and Newport News.

Hand-in-hand with conversation about service expansion comes a conversation about startup incentives. Incentives are viewed by those in the industry as a necessary part of doing business; they alone are not enough to convince an airline to introduce new service. First and foremost, airlines must see a viable market. However, incentives do help airlines mitigate risks in the short-term, responding to a new level of cautiousness in an era of “capacity discipline.” A recently published Airport Cooperative Research Program report (ACRP 142) on the *Effects of Airline Industry Changes on Small- and Non-Hub Airports* outlined the following lessons learned regarding the development of incentive programs:¹⁴⁶

- An incentive program should focus on reducing short-term risk and costs to air carriers while protecting the interest of the community. When establishing new service, air carriers face risks related to inadequate demand, the cost of hiring or moving employees, and other startup costs associated with functions such as baggage, ticketing, ground operations, etc.
- Community-driven incentive programs signal a community’s commitment and demand for air service. Incentives based primarily on outside funds signal weak community support. The federal Small Community Air Service Development Program (SCASDP) provide financial assistance to small

¹⁴¹ <http://www.easterwoodairport.com/>

¹⁴² <http://www.visitaggieland.com/bryan-college-station/getting-here/airports/>

¹⁴³ <http://researchvalley.org/real-estate-portfolio/>

¹⁴⁴ Metropolitan Washington Airports Authority. Local Leaders Tout Dulles Accomplishments, Opportunities at Dulles Matters II. <http://www.mwaa.com/about/local-leaders-tout-dulles-accomplishments-opportunities-dulles-matters-ii>

¹⁴⁵ Governor Terry McAuliffe. Governor Terry McAuliffe Unveils Biennial Budget to the Joint Money Committees. December 2015. <https://governor.virginia.gov/newsroom/newsarticle?articleId=13714#sthash.B20pokTb.dpuf>

¹⁴⁶ ACRP Report 142. Effects of Airline Industry Changes on Small- and Non-Hub Airports. 2015. <http://www.trb.org/Publications/Blurbs/173167.aspx>

communities to continue or attract new air services.¹⁴⁷ While an important resource, the program has seen mixed success and research has shown that in many cases communities rely too heavily on the grants. SCASDP funding should be seen as a complement, rather than a substitute, for community efforts.

- There is no “silver bullet incentive” and communities should use a mix of incentive types, including cost abatement, minimum revenue guarantees, and marketing assistance.

In 2011, Lynchburg was the recipient of a \$700 thousand SCASDP grant for development of service to Atlanta with low-cost carrier AirTran Airways.¹⁴⁸ Ultimately, the region was unable to make use of the funds as AirTran was acquired by Southwest Airlines making the original proposal untenable. However, the package of proposed incentives offers a picture of the scope that should be under consideration in conversations about Dulles. Strategies in the proposal included one-year revenue guarantee program (including landing fee waivers) and a marketing and advertising campaign which would include work with major employers to promote new service, as well as general advertising. The total value of the proposed package was \$1.12 million, including a proposed \$950 thousand in revenue guarantees, \$120 thousand in airport in-kind contributions such as landing fee waivers, and \$50 thousand in marketing and advertising.¹⁴⁹ Lynchburg’s peer region of College Station, TX was also awarded a 2015 SCASDP grant in the amount of \$475 thousand for service development at Easterwood Airport.¹⁵⁰ The total proposed package of \$750 thousand included a revenue guarantee (\$450,000), start-up cost offsets for a new airline establishing a new station (\$25,000), and ground handling support (\$25,000). The proposal also included funding for an initial stage of regional market and service analysis (\$100,000), followed by air carrier recruitment efforts (\$40,000) and airport and air service marketing (\$110,000).¹⁵¹

S. Coordinate data-sharing with colleges and universities - Work with higher education institutions in the region to understand growth trends that could support additional air service (e.g. research activities, online learning programs, and international students). Explore the potential of aviation programs at Liberty University.

Another finding of ACRP Report 142 regarding communication between air carriers and communities is that “Airline network route planners find information on a community’s...untapped market demand

¹⁴⁷ USDOT. Small Community Air Service Development Program (SCASDP).

<https://www.transportation.gov/policy/aviation-policy/small-community-rural-air-service/SCASDP>

¹⁴⁸ USDOT. FY2011 Small Community Air Service Development Program (SCASDP) Grant Selections.

<https://www.transportation.gov/policy/aviation-policy/fy2011-scasdp-grant-recipients>

¹⁴⁹ Community Proposal, Lynchburg Regional Airport. Small Community Air Service Development Program.

<http://www.airlineinfo.com/ostpdf82/68.pdf>

¹⁵⁰USDOT. FY2015 Small Community Air Service Development Program (SCASDP) Grant Selections.

<https://cms.dot.gov/office-policy/aviation-policy/fy2015-small-community-air-service-development-program-scasdp-grant>

¹⁵¹ APPLICATION UNDER SMALL COMMUNITY AIR SERVICE DEVELOPMENT PROGRAM DOCKET DOT-OST-2014-0113. <http://www.airlineinfo.com/ostpdf91/221.pdf>

influential during meetings.”¹⁵² In the case of the Lynchburg region, higher education institutions may represent a source of untapped or emerging market demand. The Lynchburg Regional Airport manager would benefit from university and community support in tracking opportunities that may emerge as Liberty University continues to grow as a research, international, and distance-learning institution. The region’s other colleges and universities may also present opportunities for future air demand.

Traditionally, research universities are strong generators of commerce air service demand. In February 2016, the Carnegie Commission on Higher Education awarded Liberty University the R3 classification, a doctoral university with a moderate level of research activity.¹⁵³ The university can now be called a “national university” according to US News and World Report rankings.¹⁵⁴ This is a change from Liberty’s previous designation as a regional university. For comparison, Texas A&M in College Station is an R1, or doctoral university with the highest level of research activity, while the University of California Merced is an R2. Growth in international student enrollment and distance-learning enrollment may also affect commercial air service demand, depending on the number of on-campus visits required for online programs and student and family propensity to travel. Given the complexity of these drivers of potential demand, the airport would benefit significantly from a cooperative approach with Liberty University in trying to anticipate major shifts or trends.

Finally, Liberty University’s School of Aeronautics is a growing player in the training of a new generation of pilots and other aeronautics professionals. This program and its resulting workforce may create opportunities related to air service that are not fully understood at present.

T. Develop leading economic indicators for sharing with the airline community.

The 2015 Virginia Commercial Air Service Strategic Review found that unequivocally, “Having a strong business community, a desirable destination, and a sizeable local market with demographics and growth to support new service are critical to a carrier’s success.”¹⁵⁵ Moreover, airlines are more likely to respond to information not already revealed in their own market analysis. Therefore, the economic development community in the Lynchburg region, led by the LRBA, is in a position to support air service development by providing “leading indicators” of new business activity to the airport director. Economic development professionals are on the “front lines” of efforts to facilitate business recruitment and expansion. They therefore have an important “head start” on information and data trends relative to the airlines or even the Lynchburg Regional Airport staff.

Potential Economic Gains

Potential economic gains from additional air service can be addressed in a number of ways. One approach focuses on the regional business sales that are supported by visitors arriving to the Lynchburg region on a commercial flight. Arriving visitors support local businesses by spending on lodging, food, beverages,

¹⁵² ACRP Report 142. Effects of Airline Industry Changes on Small- and Non-Hub Airports. 2015.

¹⁵³ The Carnegie Classification of Institutions of Higher Education. <http://carnegieclassifications.iu.edu/index.php>

¹⁵⁴ <https://www.washingtonpost.com/news/grade-point/wp/2016/02/04/in-new-sorting-of-colleges-dartmouth-falls-out-of-an-exclusive-group/>

¹⁵⁵ DOAV. Virginia Commercial Air Service Strategic Review. December 2015.

entertainment, and shopping. The 2011 Virginia Airport System Economic Impact Study found that in 2010, the average impact per enplanement was \$1,166 in business sales. This number includes on-airport activities as well as visitor spending effects. The actual marginal impact of any increase in traffic at Lynchburg Regional Airport would depend on the specifics of that service, including the proportion of visitors who use it and their spending profiles, which closely relates to traveler type (i.e. business versus personal and domestic versus international). Impacts would also depend on the level of additional on-airport activity associated with the introduction of new service (e.g. net increases in staff associated with airline operations).

Another way of understanding potential economic gain is through the lens of industry productivity, as was done in a recent national research study, *The Role of U.S. Airports in the National Economy* (ACRP Report 132).¹⁵⁶ The research empirically tested the nature of the air service connectivity’s relationship to the economy, summarized by the report as follows:

Development of the airport network that connects regions and countries facilitates efficiency improvements by providing a broader base of suppliers and access to new production techniques. It fosters greater competitiveness by facilitating investment within the United States and investment of U.S. companies outside U.S. borders, and by enhancing the ability to exploit economies of scale. Moreover, as global trade has expanded and the globalization of the supply chain has taken place, there is increasing evidence that connectivity (principally in the air transport network) and the advantage it provides for business, is a significant asset that enhances productivity and improves the performance of an economy, firm, or region.¹⁵⁷

Using national industry and air service connectivity data for a sample of major airports and regions in the United States, the study identified a range of connectivity measures that demonstrate a statistically significant relationship to industry productivity. The tested metrics addressed both international and domestic connectivity. Key domestic connectivity measures are presented in Table 18, ordered by their relative average impact across industries. The most influential connectivity measure identified from empirical data was the number of domestic destinations served by two or more daily nonstop flights, which was shown to affect manufacturing, information, finance & insurance, and rental & leasing industry productivity. These connectivity measures represent the types of new service to which the Lynchburg region can aspire.

Table 18 Key domestic connectivity measures, ordered by relative impact.

Connectivity Measure	Relative Impact
2 or More Daily Nonstop Domestic Flights	1
Domestic Nonstop Destinations	0.31
5 or More Daily Nonstop Domestic Flights	0.28
Airline Hubs Served-Domestic	0.28
Domestic Nonstop Departures	0.18

¹⁵⁶ ACRP Report 132. The Role of U.S. Airports in the National Economy. http://onlinepubs.trb.org/Onlinepubs/acrp/acrp_rpt_132.pdf

¹⁵⁷ ACRP Report 132. The Role of U.S. Airports in the National Economy, page 15.

Number of Airlines	0.17
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Source: ACRP Report 132. *The Role of U.S. Airports in the National Economy.*

Strategy Area 6: Access on Key Highway Corridors

Strategy: Focus on maintaining good access to the interstate system and on key corridors that connect the Lynchburg region to national and international markets, including engagement with connectivity issues outside the Lynchburg region that affect the region’s interstate access. The Lynchburg economy relies on the Virginia highway system to access material inputs and move goods to market, including infrastructure located both inside and outside the Lynchburg region.

Actions

U. Invest in key inter-regional corridors to protect and improve access to external markets, the Interstate system, and important intermodal and port facilities.

The corridor improvements listed in Table 19 were identified from the unconstrained or “Vision” project list in the current regional long range transportation plan (LRTP).¹⁵⁸ The first listed project is also included in the list of submitted but currently unfunded Smart Scale projects.¹⁵⁹ These projects are selected based on their anticipated role at addressing current or performance issues affecting broader inter-regional connectivity. Preference was given to projects serving major corridors (e.g. US 460, US 29, US 501), facilities already experiencing congestion, portions of the road network that carry significant truck traffic, and to projects that ranked relatively highly within the LRTP. As was the case with the local bottlenecks addressed under Strategy Area 2, these improvements represent potential investment types that could be pursued above a fiscally constrained build scenario through the year 2040. It should also be understood that the exact design parameters of desired improvements on these corridors may change over time in response to findings of more detailed planning and engineering exercises. Virginia as a whole is working towards finding low-cost but effective alternatives to roadway widening. A notable ongoing effort is the Route 29 Corridor Assessment in Campbell County. The VDOT Lynchburg District Office is managing this project as a pilot for the federally established SHRP2 (Strategic Highway Research Program 2) PlanWorks process, which aims to support collaborative decision-making. The study is examining a variety of access management strategies intended to address emerging bottlenecks associated with growth in the corridor. A primary goal of the effort is maintaining or improving travel times and safety for community members and for through-flows on the corridor.¹⁶⁰

¹⁵⁸ CVMPO. 2040 Long Range Transportation Plan (LRTP).

¹⁵⁹ Virginia Smart Scale. Projects. (FY2017)

¹⁶⁰ VDOT. Route 29 Corridor Assessment, Campbell County.

http://www.virginiadot.org/projects/lynchburg/route_29_corridor.asp

Table 19 Inter-regional roadway improvements identified from existing planning efforts

Project	Notes	Cost
501/221 One-Way Pair Project* (<i>Smart Scale Submission/LRTP #90, rank 3</i>)	Intersection improvement, with one-way split pairs on US 501 on either side of 221. Facilitates regional network connectivity and connect key corridors with medium truck volumes.	\$36.3 M
Wards Road Access Management (<i>LRTP #68, rank 5 & LRTP #67, rank 10</i>)	Access management and operational improvements on US 29; a primary commuter and truck corridor with congestion, near airport.	\$14.0 M
Lynchburg Expressway/Candlers Mount Road (<i>LRTP #84, rank 8</i>)	Improve interchange; connects key inter-regional corridors with high truck volumes.	\$ 16.2 M
US 501 Improvement (<i>LRTP #92, rank 20</i>)	Capacity improvement from Old Forest Rd to Rt 620; addresses future constraints on a key connector corridor. Defined in the LRTP as a widening to 4 lanes.	\$27.7 M
TOTAL – Intra-regional project set:		\$94.2 M

Source: *Smart Scale Project Application; All projects included in the 2040 LRTP Unconstrained (Vision) Plan.

V. Work with partners in surrounding regions to advance improvements that affect Lynchburg’s connectivity to outside markets.

While investments within the Lynchburg region are an important precondition to ongoing inter-regional connectivity, many facilities upon which Lynchburg businesses depend are in fact located outside the region itself. These include continuations of key corridors outside the Lynchburg region—for example, sections of US 29 north and south of the region or of US 460 to the east and west. They also include locations where Lynchburg corridors meet up with the interstate system, such as the connections between US 460 and the highway network in Roanoke and ultimately to I-81. While not directly within the control of the Lynchburg region, these inter-regional connections can be safeguarded through cooperative efforts.

W. Support the Commonwealth’s “Protecting Virginia’s Arterial Investments” program, an access management initiative currently being piloted in the Lynchburg and Salem Districts of VDOT.

The Commonwealth’s “Protecting Virginia’s Arterial Investments” program was established to “support economic development by promoting the efficient movement of people and goods” and to preserve performance on the existing system while reducing the need for new highways and road widenings.¹⁶¹ The program encourages proactive efforts to preserve and enhance arterials through an inventory and monitoring of access points and signals on the state network and through the development of arterial access management plans for key routes. Lynchburg and Salem are pilot districts for the program. The Lynchburg District’s focus includes two of this study’s key identified inter-regional corridors: US 29 and US 460.

¹⁶¹ VDOT. CTB Workshop Presentation: Access Management Protecting Virginia’s Arterial Investments. October 2016. http://www.ctb.virginia.gov/resources/2016/oct/pres/8_Access_Management.pdf

Potential Economic Gains

The projects listed in Table 19 were modelled using the region’s travel demand model to generate estimates of transportation system performance improvements in 2040 relative to a fiscally constrained pattern of investment.¹⁶² The travel model outputs include forecast reductions in vehicle hours traveled, reductions in the proportion of traffic experiencing stop-and-go congested conditions, and changes in mileage traveled in response to the release of bottlenecks on the network (Table 20). Trucks are shown to be driving somewhat further in this scenario (a negative “savings” in vehicle-miles traveled). This represents the network response predicted by the model as a bottleneck is released and trucks are now rerouting to take advantage of time savings, but are driving slightly further. Results of the travel model runs also show a small increase (0.14%) in the size of the labor market that is accessible from the Lynchburg central business district—the same scale of accessibility gain predicted from the intra-regional project bundle.

Table 20 Travel performance effects of modelled inter-regional project bundle

Reduction / Savings in 2040	Passenger Cars	Trucks (Freight)
Gross Vehicle-Miles Traveled	53,342	-44,587
Gross Vehicle-Hours Traveled	67,023	19,739
Gross Buffer Time (Hours)	33,619	9,743
Passenger Miles	64,011	-
Freight US Ton Miles	-	-277,488

Source: Lynchburg Travel Model; Analysis by Michael Baker International.

The TREDIS economic model is then used to forecast economic growth stemming from changes in transportation costs and industry productivity gains. As before, three types of effects are reported:

- **Construction Impacts** are short term impacts associated with spending on materials and labor in the course of project construction (also sometimes called stimulus effects);
- **Operational Impacts** are associated with reductions in vehicle operating costs, reduced travel time, and decreased congestion.
- **Labor Market Impacts** are associated with improved business productivity due to the ability to access a wider pool of qualified workers.

All reported economic impacts include multiplier effects associated with increased supplier purchases and recirculation of worker income as it is spent at local businesses. Cumulative long term impacts through

¹⁶² The baseline scenario included construction of the LRTP Financially Constrained 2040 Project List, currently funded Smart Scale projects (#529, 528, and 681, FY2017), and recently initiated projects in the vicinity of Liberty University that are all anticipated to be completed by 2040. Guidance on baseline scenario definition was provided by the VDOT Lynchburg District Office and the Region 2000 Local Government Council. The modelling assumed a 7-year construction period, a 35-year analysis period, and was run using the assignment routine, only (i.e. assumed no major trip distribution would be caused by the projects).

the year 2050 would amount to approximately \$150 million in additional business sales. By 2050, 51 new jobs would be added in the economy. Compared to the intra-regional bundle of projects, this set of improvements show slightly greater effects, both because it a slightly bigger program (in dollars of investment terms), and because the travel model forecasts somewhat stronger operational savings. As was the case previously, the moderate scale of total impacts reflects the tactical nature of the modeled projects and the relatively built-out and uncongested nature of the existing and committed¹⁶³ highway system in the region.

Table 21 Economic impact of modelled inter-regional project bundle

Year	Business Sales (\$M's)	Value Added (\$M's)	Jobs	Wage Income (\$M's)
Short Term Cumulative Effects (2016-2022)			Avg. Annual	
Construction	\$110	\$59	116	\$49
Long Term Cumulative Effects (2018-2050)			In 2050	
Operational	\$69	\$30	18	\$20
Labor Market	\$85	\$52	33	\$31
<i>Total</i>	<i>\$154</i>	<i>\$83</i>	<i>51</i>	<i>\$51</i>
Effects in Future Years:				
In Year 2050	\$5.7	\$3.1	51	\$1.9

Source: TREDIS; EDR Group Analysis.

Strategy Area 7: Cargo Oriented Development

Strategy: Enhance local readiness to respond to freight rail oriented development opportunities. The Lynchburg region is served by two Class I railroads with no major capacity constraints. While freight rail service in the region is limited to carload rather than containerized traffic, and the region is too close to existing intermodal container terminals to be a candidate for a new one, there nevertheless may be ways for the region to capitalize on the its significant freight rail infrastructure. Specific actions can be taken to align public sector actions with anticipated private sector interest.

Actions

- X. Build awareness of the Virginia Rail Industrial Access program within the regional economic development community as a tool for supporting new cargo oriented development.**

The Virginia Rail Industrial Access Program provides funds to facilitate new industrial development that will use the freight rail system. Within a given locality applicants may request up to \$450 thousand each fiscal year. Grants may in total cover up to 15 percent of the total capital costs of the project, with a dollar-for-dollar for match required for the first \$150 thousand of funds. Applications require a local resolution

¹⁶³ Performance effects are measure relative to the network that will be in place, based on committed projects and funds designated in the *constrained* long-range plan.

of support. The program is designed to prioritize development that will generate significant impacts on both the volumes carried by the rail system, and on a given locality’s economy. Evaluation criteria include total number of carloads generated and added full-time employment. Projects that involve higher proportions of local funding are also given priority. After funds are awarded, the State subsequently monitors grantees to ensure they reach forecast performance in terms of carloads generated. Eligible expenditures include engineering; site preparation (including grading and drainage); track construction, rehabilitation, or improvement; and environmental mitigation.

Y. Focus industrial development efforts on sites adjacent to existing rail infrastructure and customers.

There are two factors that make incremental rail-oriented development easier than development on greenfield sites: First, it is easier from an environmental review and community perspective to expand industrial activity where it already exists. Second, this approach recognizes the underlying market economics that railroads are concerned with—i.e. how to balance profits from new customers against the costs of interrupting through-flows on a rail main line. Existing rail users will already be part of a railroad’s operating scheme and therefore new users can be accommodated with adjustments that are more incremental than would be required for a greenfield site. The risk of interruption to through-flows is of particular concern in Lynchburg due to the presence of high-value and therefore time-sensitive double-stack intermodal trains moving through the region. Figure 28 shows a number of example locations in the Lynchburg region, including land adjacent to the airport, the Oddfellows Road area, and Tomahawk Industrial Park, where Tomahawk Warehousing Services offers inside rail as well as logistics services.¹⁶⁴

Figure 28 Example locations that are adjacent to existing rail infrastructure and rail customers



Source: EDR Group. Aerial images from Google, rail network (shown in red) shapefiles from the National Transit Atlas Database.

¹⁶⁴ Tomahawk Warehousing Services, LLC. Services. <http://www.tomahawklc.com/services>

Z. Continue ongoing open lines of communication between the Class I railroads and the region through the Commonwealth Transportation Board's Rail Subcommittee.

The success of any current or future freight-rail-oriented development initiatives will depend largely on what is deemed feasible and desirable by the Class I railroads who own and operate on freight rail lines in the region. Recognizing this infrastructure as an existing asset to be built upon, the region should maintain open communication channels with the railroads (Norfolk Southern and CSX) through the Commonwealth Transportation Board Rail Subcommittee. The region should seek to stay informed regarding rail commodity market trends and any emerging constraints on the network (e.g. overly busy railroad crossings), while offering reciprocal information sharing on business recruitment or expansion prospects, land development plans, and any relevant shifts in regional zoning policies.

Alignment with initiatives in the Comprehensive Economic Development Strategy (CEDS):

The following initiative was defined within the Region 2000 CEDS process and is directly related to the cargo oriented development area of this connectivity study, as well as to economic development more broadly in the region.¹⁶⁵ This initiative is grouped under the CEDS Goal IV, “investing in the connectivity of our region.”

KEY INITIATIVE #9 - Develop and implement a regional Site Evaluation and Improvement Program to accelerate the preparation and availability of shovel-ready industrial sites in the region.

Potential Economic Gains

The realization of economic gains from cargo oriented development will depend on interest from the private sector. Existing industries that rely on rail in the region provide a picture of the types of businesses that might be expected to take advantage of rail access in the future. These include a number of more traditional heavy manufacturing sectors including plastics and rubber products, paper, textiles, fabricated metal, and chemical manufacturing.¹⁶⁶ In addition, there are economic benefits that research shows are generated by spatial clustering of freight and logistics activities. Clustering of shippers and carriers can lower transportation costs by enabling vehicles to be filled more quickly and efficiently. Clustering can also create the potential for more efficient resource use and management of fluctuating demand through sharing of equipment and warehouse space. Clustering tends to support productivity gains from knowledge spillovers, and through the development of a specialized labor pool.¹⁶⁷ Finally, clustering of rail-oriented businesses can create advantages by enticing better service from railroads with more concentrated demand.

¹⁶⁵ Virginia’s Region 2000. Comprehensive Economic Development Strategy (CEDS). November 2016.

¹⁶⁶ TREDIS fueled by Transearch. 2012 data.

¹⁶⁷ Sheffi, Yossi, et al. Logistics-Intensive Clusters: Global Competitiveness and Regional Growth, working paper. <http://sheffi.mit.edu/sites/default/files/LogisticsClustersV4.pdf>

DIGITAL CONNECTIVITY

Strategy Area 8: Broadband Coverage

Strategy: Pursue a minimum target speed of 25 mbps download/3 mbps upload for broadband coverage throughout the region, as recommended by the Federal Communications Commission. Capitalize on existing fiber-optic assets by building them into economic development strategy and site selection.

Actions

AA. Market the strong existing fiber network as an asset in regional economic development efforts.

Lynchburg is served by an existing fiber optic network that could be further marketed as an economic development asset to companies considering a relocation to the area or entrepreneurs interested in starting new businesses. The Lumos Networks fiber optic map (Figure 23 in Chapter 3) is a resource that local economic development and site selection professionals can use to identify already-connected (lit) buildings and either encourage co-location or new connections along existing fiber optic lines.¹⁶⁸

BB. Expand broadband improvements in rural areas including seeking both funding and partnerships.

There are several places Lynchburg can turn for support in expanding broadband. Virginia's Office of Telework Promotion and Broadband Assistance provides information to individuals, businesses, and communities in need of broadband service.¹⁶⁹ The website provides guidance on how to identify current needs, form partnerships, and secure funding for broadband projects. Resources listed on the site include:

- Governor's Development Opportunity Fund Program
- Economic Development Grant Program
- Virginia Resources Authority
- USDA Community Connect Grants

Community Connect Grants offered through the U.S. Department of Agriculture are another resource.¹⁷⁰ State and local governments serving poorly-connected rural areas can use awarded funds to deploy new broadband service and provide service free-of-charge through designated community facilities.

Communities across Virginia have adopted a variety of approaches to community-led broadband initiatives. In neighboring Roanoke, the Roanoke Valley Broadband Authority was established in 2013 following a 2012 Broadband Study and set of Task Force recommendations. The Authority, established under the Virginia Wireless Service Authority Act, has developed "over 50 miles of secure, high speed,

¹⁶⁸ Visit <https://www.lumosnetworks.com/business/fiber-maps> to view the network map.

¹⁶⁹ www.wired.virginia.gov

¹⁷⁰ USDA, Community Connect Grants, <http://www.rd.usda.gov/programs-services/community-connect-grants>

open access fiber” and started serving business, governments and non-profit customers in May of 2016.¹⁷¹ The Virginia Office of Telework Promotion and Broadband Assistance created an online 5-step toolkit for communities interested in enhanced broadband delivery.¹⁷² Included in the toolkit is information on different legal structures that communities may use to facilitate the delivery of broadband services, including Broadband Authorities. The Commonwealth Transportation Board (CTB) Innovation and Technology Subcommittee is another State-level organization through which to monitor potential synergies between multiple statewide connectivity efforts. These might include opportunities posed by the recently passed Virginia House Bill 912 which allows VDOT to “permit broadband service providers to install conduit capable of housing fiber optic cable to provide broadband service on public highways,” thus decreasing the upfront costs of extending infrastructure to underserved and unserved areas.¹⁷³

Alignment with initiatives in the Comprehensive Economic Development Strategy (CEDS):

The Region 2000 CEDS process includes a suggested investigation of free public wireless internet in public parks, downtowns, and activity centers.¹⁷⁴

This suggestion is presented under the CEDS Goal IV, “investing in the connectivity of our region,” along with a more general initiative (#8) to *Update project priorities and implement the region’s existing plans for transportation, broadband, and other infrastructure provision based on relevant takeaways from the Central Virginia Connectivity Study.*

Potential Economic Gains

Broadband access integrates under-served and rural communities into wider social and economic networks, provides access to online education, and enables companies to better compete in a highly-connected economy. Table 22 lists the top ten industry sectors by their level of reliance on telecommunications, demonstrating that a range of industries depend on digital connectivity. The most telecom-dependent industries were identified by using national data to measure the amount they spend on inputs from telecom carriers to produce \$100 of output.¹⁷⁵ Many of these industries have a presence in the Lynchburg region and provide services that require a highly-skilled workforce. As technology advances, the importance of high-speed broadband will only increase.

¹⁷¹ Roanoke Valley Broadband Authority Recognized with Governor's Award, Grows Staff to accommodate increasing demand. Sept. 27, 2016. <http://highspeedroanoke.net/wp-content/uploads/2016/09/Governors-Technology-Awards-and-Dave-Armentrout.pdf>; Roanoke Valley Broadband Authority. Services.

<http://highspeedroanoke.net/services> and History <http://highspeedroanoke.net/about-us/task-force-history-2>.

¹⁷² Virginia Office of Telework Promotion and Broadband Assistance. Broadband Toolkit.

<https://www.wired.virginia.gov/toolkit/>

¹⁷³ “Mapping and Bridging Virginia's Broadband Divide,” The Daily Progress, http://www.dailyprogress.com/townnews/economics/mapping-and-bridging-virginia-s-broadband-divide/article_a4e3d180-2c4d-11e6-aa03-0770fd8d7150.html

¹⁷⁴ Virginia’s Region 2000. Comprehensive Economic Development Strategy (CEDS). November 2016.

¹⁷⁵ We used the 2007 (389-industry) version of the Direct Requirements/After Redefinitions/Producer Value table located at https://www.bea.gov/industry/io_annual.htm.

Table 22. Ten Most Digitally-Dependent Industries Ranked by the Amount Spent on Inputs from Wired Telecommunications Carriers per \$100 of Output

NAICS	Industry	Ranking by Telecom Requirements
513	Broadcasting and telecommunications	1
514	Data processing, internet publishing, and other information services	2
523	Securities, commodity contracts, and investments	3
561	Administrative and support services	4
493	Warehousing and storage	5
624	Social assistance	6
621	Ambulatory health care services	7
622	Hospitals	8
532	Rental and leasing services and lessors of intangible assets	9
512	Motion picture and sound recording industries	10

Source: U.S. Bureau of Economic Analysis

IMPLEMENTATION AND NEXT STEPS

Implementation of these strategies and actions is crucial to enhancing connectivity in this region, and to the ultimate goal of strengthening the regional economy. As identified in this study, a major theme that has emerged is that of communication and collaboration based on shared objectives. This theme is especially crucial as the focus shifts to the next steps of implementing the action plan. The efforts of a number of different stakeholders, both in the public and private sectors, and their agreement on roles and responsibilities, will be vitally important to promoting regional economic growth through these actions.

A coordinated discussion on regional implementation has already begun and will continue in the coming months to clarify the “who, what and when” of implementation. Even before the final study report was complete, a series of meetings was held to present the draft findings, strategies and actions and begin discussing potential groups that would take ownership of strategy areas and subsequent actions. These meetings were:

- September 9th, 2016
 - Joint meeting of regional stakeholders, including LRTAG (Lynchburg Regional Transportation Advocacy Group) and BREC (the Blue Ridge Economic Coalition) members to share the draft study findings and discuss potential implementation efforts.
- October 7th, 2016
 - Joint meeting of regional stakeholders including LRBA (Lynchburg Regional Business Alliance), Lynchburg Office of Economic Development, Region 2000 Local Government Council, and Central Virginia MPO.
- November 15th, 2016
 - Meeting of LRBA (Lynchburg Regional Business Alliance) and other stakeholders to discuss potential leaders for each strategy area.

- November 17th, 2016
 - Meeting with the Technical Committee of the Central Virginia Metropolitan Planning Organization's (CVMPO) to share the draft strategies and actions and discuss their potential role in implementation.

As a result of these initial discussions, a number of potential leadership/champion roles have emerged that are a starting point for taking ownership of individual strategy areas and their corresponding sets of actions. These roles may change and evolve as the discussions continue but a preliminary list is shown in Table 23.

Next Steps

The meetings and discussions that have been held to date are a starting platform for affirming the overall implementation framework for the proposed strategies and actions in the coming months. Through these discussions, some recommended next steps have been proposed that will help ensure continued engagement in this process and ultimate success in achieving the vision for regional connectivity and economic growth:

- Continue the “roll out” of the study findings and recommendations through presentations at key meetings.
- Put links to the study report on agency websites, such as VDOT, LRBA, Region 2000 website and the CEDS dashboard site.
- Institute a schedule of stakeholder meetings at a quarterly (or semiannual or annual) basis that will report out on progress in each of the strategy areas and discuss next steps.

The long-term implementation of the recommendations in this study will rely heavily on continued discussion, engagement and knowledge-sharing across a broad spectrum of stakeholders. The Lynchburg region's success in building greater connectivity across its territory will ultimately depend on the continued strong connectivity among its leadership.

Table 23 Potential leadership/champion roles for strategy implementation

Strategy Area	Potential lead/champion partners*	Potential support partners*
1. Placemaking	OED, LGC	
2. Local Bottlenecks	CVMPO, VDOT, LRTAG	
3. Transit & TDM	GLTC, LGC RIDE Solutions	
4. Intercity Passenger Rail	CTB Rail Subcommittee	CVB
5. Air Service Development	LYH	LRBA Air Service Development Committee
6. Access on Key Highway Corridors	CVMPO, VDOT, LRTAG	
7. Cargo-Oriented Development	LRBA, CTB Rail Subcommittee	
8. Broadband Development	LRBA, Technology Council	
* Note that these roles are very preliminary and results from initial discussions. They will be refined and confirmed with additional discussions.		
ABBREVIATIONS: CTB: Commonwealth Transportation Board CVB: Lynchburg Convention & Visitor’s Bureau CVMPO: Central Virginia Metropolitan Planning Organization GLTC: Greater Lynchburg Transit Company LGC: The Region 2000 Local Government Council LRBA: Lynchburg Regional Business Alliance LRTAG: Lynchburg Regional Transportation Advocacy Group LYH: Lynchburg Airport OED: Lynchburg Office of Economic Development VDOT: Virginia Department of Transportation (Lynchburg District)		

APPENDIX 1: INTERVIEW GUIDES

REGIONAL EXPERT INTERVIEW GUIDE

PART I – CONNECTIVITY AND REGIONAL COMPETITIVENESS

1. Describe the Competitiveness of the Region

- Advantages
- Disadvantages
- Key competitors or benchmarking communities outside the region

2. Identify Key Actors in the Region

- Firms
- Institutions or organizations
- Key locations or clusters of activity

3. Discuss the Role of Transportation and Other Success Factors

- What are some the biggest challenges currently in terms of labor force access or logistics operations?
- How important is transportation, relative to other issues (e.g. labor cost competitiveness, tax burden, housing affordability, electricity costs, workforce skills, broadband access, other livability factors)?
- Identify known transportation issues, and practical strategies adopted in the region to manage these constraints.

4. Describe How the Region Has Evolved Over Time

- Changes in the level of activity
- Changes in the role of Lynchburg regional operations relative to other locations (in the U.S. or world)
- Significant improvements or degradation in transportation performance or regional competitiveness
- Recent wins or losses in the region, and the reasons for those successes/failures

PART II – EMERGING TRENDS

5. Identify Trends Affecting the Regional Economy and the Role of Connectivity

- Demographics and preferences
- Industry mix
- Shifts in the national or global market or supply chain (that affect relative competitiveness or sourcing/marketing strategies)
- Technology and skills requirements

- Costs (e.g. energy costs)
- Policies or regulations

6. Anticipated Challenges from Emerging Trends

- How will known transportation issues be affected by emerging trends in the region?
- Given your past experience, what do you see as limitations that may face the region due to anticipated changes?
- Are there workforce, recruitment, or logistics operations strategies that may no longer be adequate in the future?
- Discuss any known future business plans (3, 5, and — if possible 10 years out) for expansion, relocation, or consolidation of operations in the region that are dependent on or related to transportation infrastructure.

TRANSPORTATION SERVICE PROVIDER INTERVIEW GUIDE

PART I — CURRENT OPERATIONS AND TRANSPORT ISSUES

1. Current Services and Operations

- Freight or passenger service to or through the region
- Data on service – passengers or freight served
- Recent and near-term anticipated changes

2. User Base

- Major companies served
- Other business/institutional users

3. Challenges and Sensitivity to Connectivity Issues

- Biggest challenges currently in terms of attracting users
- Transportation or logistics issues affecting the users, and practical strategies adopted to manage those constraints.

PART II — FUTURE OPERATIONS AND ANTICIPATED NEEDS

4. Changing Role Over Time

- Changes in the level of activity
- Changes in the importance of this region compared to others in the state
- Changes in reliance on modes in the future for this region

5. Expected Changes and Anticipated Impact on Future Operation Needs

- Nature of expected changes in conditions: improvement, about the same, worse?
- Adjustments for these changes in future operations
- Future plans (3, 5, and — if possible 10 years out) for transportation infrastructure.
- Impact of future transportation system investment, on growth outlook

Other factors that influence future planning – importance of transportation system performance and access relative to these other factors?

BUSINESS INTERVIEW GUIDE

PART I — COMPANY OPERATIONS AND TRANSPORT NEEDS

1. Describe Current Company Operations

(Note: interviewer will conduct preliminary research online prior to the interview, but will verify information with the interviewee).

- Products/services
- Locations
- Number of employees by location
- Role of operations in the region and the state
- Role of operations outside of Virginia
- Near-term anticipated changes

2. Describe Current Transportation-Related Operations

A. Transporting supplies and finished materials:

- Types of business suppliers and customers
- Locations (distances), modes, routes, facilities (e.g., ports, terminals) used

B. Staffing & commuting:

- Types of occupations, shifts, times
- Specific modes, routes, services that are heavily relied upon
- Patronage of non-auto transportation (e.g. public transportation, biking, walking)

C. Elements of the transportation system and support used in daily operations:

- Distribution warehouses (suppliers, in-house, other)
- Freight services (courier, rail, trucking, air, forwards & expeditors).
- In-house vehicle fleet (cars, light trucks, heavy trucks, rail cars)
- In-house facilities (e.g., loading docks)
- Employee transportation programs (e.g. van pooling, ride-sharing, emergency ride home, Transportation Demand Management program participation, or subsidized transit passes)

3. Business Practices: Challenges and Sensitivity to Connectivity Issues

A. The Role of Transportation and Other Success Factors:

- What are some of your biggest challenges currently in terms of labor force access or logistics operations?

- How important is transportation, relative to other issues (e.g. labor cost competitiveness, tax burden, housing affordability, electricity costs, workforce skills, broadband access, other livability factors)?
- How do your costs of operations compare with those of other operations located elsewhere?
- Is there any advantage/disadvantage to your Lynchburg region location relative to your competitors?

B. Transport Sensitivity

- Describe incoming/outgoing delivery routes and key issues
- Describe the importance of “on-the-clock” travel within or outside the region
- Goods movement time sensitivity (perishability, schedule sensitivity, delay/variability)
- Schedule sensitivity of employees (including shift changes/starts)
- Effect of commute and location(s) on recruitment and retention of workers, relative to other factors

C. Transportation Areas of Concern: identify locations on the existing transportation network that affect business operations, or additional non-transportation factors that directly affect the cost, productivity, and efficiency of business activities.

- Specific corridors, intersections, or segments on the road network
- Rail lines, transit service, other modes and facilities
- Describe the costs and consequences of these areas of concern: delays or variability in shipments, workforce availability, limitations on delivery range or volume
- Adjustments: describe how managers have worked around these issues in the past

D. Non-Transportation Areas of Concern: identify any non-transportation connectivity issues, such as access to an appropriately skilled workforce, or the availability of broadband/telecommunications infrastructure, that directly affect the cost, productivity, and efficiency of business activities.

PART II — EVOLUTION OF OPERATIONS AND ANTICIPATED NEEDS

4. Describe How Company Operations & Needs Have Evolved Over Time

A. Change in company operations

- Change in products/services
- Locations
- Role of operations in the Lynchburg region
- Role of operations in the rest of Virginia, or outside the state

B. How have the changes influenced the firm's operations & needs?

- Transporting supplies and finished materials (locations, modes, facilities, routes)
- Staffing & Commuting (occupations, shifts, times, modes, routes, residential relocation)
- Elements of the transportation system and support used in daily operations (distribution warehouses, freight forwarders, in-house fleet and/or facilities)

- Non-transportation infrastructure requirements

5. Describe Expected Changes and Anticipated Impact on Future Operation Needs

C. Expectations: currently anticipated impact of transportation system performance on future operational needs:

- Nature of expected changes in conditions: improvement, about the same, worse?
- How do you expect your future operations to adjust for these changes?
- What do you expect the impact will be on your business operations, productivity, and future expansion capacity?

D. Future Operations and Plans: Discuss any future plans (3, 5, and — if possible 10 years out) for expansion, relocation, or consolidation of operations that are dependent on or related to transportation infrastructure:

- How, if at all, does transportation infrastructure condition and future transportation system investment, influence choice of future expansion locations?
- What other factors that influence your future planning? How important is transportation system performance and access relative to these other factors?

APPENDIX 2: PEER REGION ANALYSIS

This section presents the full results of the peer region analysis introduced in Chapter 1. The following reviews the process used to identify comparison regions. Subsequently, each performance category is discussed in terms of its economic rationale, Lynchburg's relative performance, and potential lessons learned from peer region experience. The write-up concludes with a side-by-side comparison of all metrics in Table 27.

IDENTIFYING PEER REGIONS

The process of selecting peer regions begins with an analysis of the size and performance of the Lynchburg region compared to other metropolitan areas.

Population

Approximately 257,600 people live in the Lynchburg region, placing the region below that of places like Amarillo and Wilmington in terms of size, and above places like Binghamton and Tuscaloosa (see Table 24).¹⁷⁶ The Lynchburg region stands in the middle of the pack for similarly sized metropolitan areas in terms of population growth occurring from 1998-2013, years that include periods of economic contraction (recession) and expansion.¹⁷⁷ During this period, the metros in Table 24 grew at an average 15-year rate of 1.1 percent. The Lynchburg region grew by 0.9 percent, slightly below average, while all but one of the other metros in the U.S. Southeast grew at a faster rate. Average growth among similarly sized metros in the U.S. Southeast, Lynchburg included, is 1.2 percent. Among the entire sample, Wilmington experienced the highest growth (2.1%), and Binghamton experienced the lowest (-0.2%).

While no other Virginia metro has a population size within ten percent of Lynchburg's, their inclusion in this analysis is important because regionally-specific attributes such as climate, terrain, and location relative to major markets can influence the economic performance. The Region 2000 CEDS, for instance, compares Lynchburg with Roanoke and Charlottesville. The current CEDS is again comparing Lynchburg with Roanoke, but also adds Chattanooga, Tennessee, and Spartanburg, South Carolina to the comparison (for reasons other than geographic proximity).¹⁷⁸

¹⁷⁶ Based on American Community Survey 2014 1-Year Estimates for the Lynchburg MSA

¹⁷⁷ According to the National Bureau for Economic Research, the official arbiter of U.S. recessions (see <http://www.nber.org/cycles.html>)

¹⁷⁸ Market Street Services.

Table 24. Metros with Populations within 10 Percent of the Lynchburg Region, their Rate of Population of Change & their Geographic Region

	Population, 2014	Population Change, 1998-2013	Geographic Region
Larger Regions			
Wilmington, NC Metro Area	272,500	2.1%	Southeast
Santa Cruz-Watsonville, CA Metro Area	271,800	0.5%	Far West
Laredo, TX Metro Area	266,700	2.4%	Southwest
Merced, CA Metro Area	266,400	1.8%	Far West
Olympia-Tumwater, WA Metro Area	265,900	1.8%	Far West
Cedar Rapids, IA Metro Area	263,900	0.8%	Plains
Waco, TX Metro Area	262,000	0.8%	Southwest
Amarillo, TX Metro Area	261,800	1.0%	Southwest
Hagerstown-Martinsburg, MD-WV Metro Area	260,100	1.6%	Mideast
Crestview-Fort Walton Beach-Destin, FL Metro Area	258,000	1.4%	Southeast
Lynchburg, VA Metro Area	257,600	0.9%	Southeast
Smaller Regions			
Bremerton-Silverdale, WA Metro Area	254,200	0.7%	Far West
Sioux Falls, SD Metro Area	248,300	2.1%	Plains
Yakima, WA Metro Area	247,700	0.8%	Far West
Binghamton, NY Metro Area	247,200	-0.2%	Mideast
College Station-Bryan, TX Metro Area	240,000	1.9%	Southwest
Champaign-Urbana, IL Metro Area	238,700	0.8%	Great Lakes
Tuscaloosa, AL Metro Area	236,000	1.1%	Southeast
Topeka, KS Metro Area	233,800	0.3%	Plains
Macon, GA Metro Area	233,200	0.3%	Southeast
Appleton, WI Metro Area	231,500	1.0%	Great Lakes

Source: Population comes from the American Community Survey 2014 1-Year Estimates; population change comes from the U.S. Cluster Mapping Project; regions defined by U.S. Bureau of Economic Analysis

By population size, Lynchburg ranks sixth out of Virginia’s 11 metros (Table 25). Roanoke and Charlottesville, Lynchburg’s closest neighbors, have regional populations of 312,837 and 227,738, respectively. (The population of the Charlottesville metro is barely beyond the 10 percent threshold.) Lynchburg’s regional population growth from 1998-2013 again places it in the middle of the sample. Growth among Virginia metros averaged 1 percent during this period, and Lynchburg grew at three times the rate of the Bristol metro but less than half the rate of the Winchester metro.

Table 25. Population of Other Virginia Metros and their Rate of Population Change

Region	Population, 2014	Population Change, 1998-2013
Washington-Arlington-Alexandria, DC-VA-MD-WV Metro Area	6,032,744	1.5%
Virginia Beach-Norfolk-Newport News, VA-NC Metro Area	1,717,387	0.6%
Richmond, VA Metro Area	1,260,668	1.3%
Roanoke, VA Metro Area	312,837	0.6%
Kingsport-Bristol-Bristol, TN-VA Metro Area	308,590	0.3%
Lynchburg, VA Metro Area	257,600	0.9%
Charlottesville, VA Metro Area	227,738	1.4%
Staunton-Waynesboro, VA Metro Area	119,766	0.7%
Blacksburg-Christiansburg-Radford, VA Metro Area	181,249	0.7%
Harrisonburg, VA Metro Area	130,649	1.4%
Winchester, VA-WV Metro Area	134,221	1.9%

Source: Population comes from the American Community Survey 2014 1-Year Estimates; population change comes from the U.S. Cluster Mapping Project

Economic Performance

Total population is just one indicator used to identify and compare peer and aspirational regions. Regions with similarly-structured economies are likely to face similar conditions, in part because local industries may export to the same domestic and international markets or recruit workers with similar skillsets. In addition, a review of population and employment trends experienced by other metros enables identification of top-performing regions that Lynchburg may wish to emulate. The analysis also considered levels of industry diversity, a metric that relates to a region’s ability to withstand recessions and other booms and busts in industry employment. Industry diversity represents the “evenness” of a region’s employment distribution across industries. Low diversity implies that employment is concentrated in only a few industries; high diversity implies a more even distribution across a variety of industries.¹⁷⁹

Selected Regions

College Station-Bryan, TX

College Station-Bryan is a metropolitan area located east of Austin and northwest of Houston in Brazos County, Texas. The region has a slightly smaller population than Lynchburg’s but is growing at more than double the rate (see Table 24). In terms of economic structure, College Station-Bryan is less reliant on manufacturing than Lynchburg is, but more reliant on business services, education, healthcare, and arts

¹⁷⁹ See http://www.arc.gov/research/researchreportdetails.asp?REPORT_ID=108 for more information of the three types of economic diversity.

and entertainment. Although College Station-Bryan is in a different part of the U.S., the region is similarly situated near major metros and is not along an Interstate highway. The region also has a large university (Texas A&M) and a small airport. Unlike Lynchburg, College Station-Bryan does not have Amtrak service.

Between 1998-2013, the College Station-Bryan region grew in total population by 1.9 percent, compared with 0.9 percent in the Lynchburg region (see Table 27).¹⁸⁰ During the same period, the young adult population (18-34 years old)—an important demographic to attract and retain—grew by 1.5 percent in College Station-Bryan but declined by 0.9 percent in Lynchburg. College Station-Bryan’s economy has also grown faster than Lynchburg’s; between 2009-2013, regional employment grew 5.5 percent while declining by 2.2 percent in Lynchburg.¹⁸¹ During the same period, industry production (value added) in College Station-Bryan grew 14.6 percent, a rate significantly higher than Lynchburg’s 1.4 percent. Finally, Lynchburg’s regional economy is more diverse in terms of industry mix than College Station-Bryan’s, likely reflecting the fact that the higher education sector employs a greater share of workers in College Station-Bryan than in Lynchburg.

Merced, CA

The Merced region is also in a different part of the U.S. than Lynchburg and an aspirational region in the sense that its population and economy is growing faster. Merced and Lynchburg are otherwise similar in several ways, making their comparison especially insightful. Like Lynchburg, Merced has Amtrak service and a small airport, but is not situated along an Interstate. The region’s economy is more reliant on agriculture but otherwise similar to Lynchburg’s in terms of industry mix. Unlike Lynchburg, Merced has an automotive manufacturing cluster. Merced also has a university (University of California) and liberal arts college (Merced College).

Between 1998-2013, the Merced region’s total population grew 1.8 percent while its young adult population grew 1.2 percent. Merced also experienced strong economic growth from 2009-2013, with employment growth of 6.8 percent and industry production growing 3.1 percent. Merced’s regional industry mix—placed at the 64th percentile among all regions of the U.S.—is just as diverse as Lynchburg’s.

Wilmington, NC

Wilmington is situated along the Atlantic Seaboard in the same part of the country as Lynchburg. The Wilmington region is larger than the Lynchburg region but stands within 10 percent by population and, like College Station-Bryan and Merced, is growing faster. Wilmington has a larger airport than Lynchburg and is situated along an Interstate, but has no Amtrak service. The regional economy is more reliant on business services and arts and entertainment. Wilmington also has a large university (University of North Carolina) and small community college (Cape Fear).

The Wilmington region performs better than Lynchburg across all indicators. Between 1998-2013, the region’s population grew 2.1 percent while its young adult population grew 0.9 percent. Lynchburg’s total population grew by 0.9 percent and its young adult population fell by 0.9 percent during this period. From

¹⁸⁰ U.S. Cluster Mapping Project

¹⁸¹ Moody’s Analytics

2009-2013, employment in the Wilmington region grew by 2.1 percent while falling by 2.2 percent in Lynchburg. Industry production in Wilmington grew 8.9 percent during the period while growing 1.4 percent in Lynchburg. Finally, Wilmington's industry mix is exceptionally diverse, falling at the 90th percentile nationally.

COMPARING REGIONS

Cost of Doing Business

Industry associations, site selectors, and the businesses they represent often emphasize the costs of doing business as one of the primary factors affecting competitiveness. Cost considerations are particularly important among manufacturers, given the significant investments they make in things like equipment, electricity, and transportation. One illustrative example comes from the National Association of Manufacturers. Every year, the industry association conducts a Manufacturers' Outlook Survey. In the most recent survey (Q1 2016), 73 percent of the 348 firms surveyed reported an unfavorable business climate (e.g., taxes, regulations) as a primary business challenge.¹⁸² (Attracting and retaining a quality workforce, something describe later on, was also reported as a primary challenge by half of the firms surveyed.)

Because researchers identify site selection factors using survey methods, it is difficult to determine which have an actual effect on regional growth controlling for other factors like firm-level productivity. Moreover, by surveying business executives, these types of surveys are subject to bias. This is because respondents may overemphasize factors that, if addressed, will have a favorable impact on their own business, or cite perceived challenges that are in reality caused by internal, controllable conditions (e.g., poor marketing). Regardless, it is important to consider this category because perception matters to a region's ability to attract and maintain employers.

Compared with the selected peer regions, Lynchburg's business climate falls somewhere in the middle. Average labor costs are slightly lower in the Lynchburg region than they are Merced and Wilmington, but 5 percent higher than they are in College Station-Bryan. In 2012, state and local taxes combined were 8.6 percent of Virginia's GDP, compared with 8.1 percent in Texas, 8.8 percent in North Carolina, and 10.5 percent in California.¹⁸³ Businesses paying industrial-level electricity prices (generally the largest electricity consumers) spend an average of 7 cents per kilowatt-hour in the Lynchburg region, compared with 5 cents in Texas, 6 cents in North Carolina, and 11 cents in California.¹⁸⁴

The cost of doing business in Virginia and the Lynchburg region is average relative to its peers. And while municipalities like those in the Lynchburg region may not have the power to (or even wish to) further lower labor costs, taxes, and electricity prices, there are other ways to help local businesses cut costs. Lynchburg and its four peer regions each have a small business development center that provides

¹⁸² <http://www.nam.org/outlook/>

¹⁸³ Tax statistics are available at the state level only.

¹⁸⁴ Average electricity prices are available at the state level only.

consulting services and educational opportunities.¹⁸⁵ Receiving specialized support from these centers may help businesses cut costs associated with regulatory burdens or other challenges that owners do not have the in-house capacity to address.

North Carolina's Small Business and Technology Development Center (SBTDC) stands out among the comparison regions because of the type and breadth of specialized services it offers. Supported by the U.S. Small Business Administration, SBTDC's 10 regional branches, including one in Wilmington, provide specialized counseling in the following areas:¹⁸⁶ selling to the government; international business/exporting; market research; private equity (fundraising); strategy and growth; and technology development and commercialization. These types of services may be particularly helpful for businesses trying to grow without having to hire specialists. In addition, to the extent companies benefit from SBTDC services, export promotion and increased technology commercialization serve strategic purposes that are describe later in the section on innovation.

Connectivity and Market Access

Connectivity—the subject of this study—is an important lens through which to assess Lynchburg's competitiveness. In the same way that business friendliness is partly a matter of perception, interregional connectivity is both a function of actual performance and of image. While feelings of association are difficult to discern, we can measure a number of factors that are known to improve real levels of connectivity.

Unlike the selected peer regions, Lynchburg is centrally located between two “megaregions” of the United States. The Northeast and Piedmont Atlantic megaregions are both highly connected epicenters of economic activity that transcend state borders.¹⁸⁷ In addition to marketing itself as within a day's drive of individual East Coast cities, the Lynchburg region may benefit by asserting its advantageous position between two megaregions.

The Lynchburg-accessible labor market is the smallest of the four comparison regions. This metric is calculated as the total population within a 40-minute drive time, measured relative to the center of population of each region's most central county. Larger labor markets create productivity benefits through agglomeration economies as firms are better able to match job requirements to the available working population.¹⁸⁸ In the case of Lynchburg, there are parts of the metropolitan area that are more than forty minutes from the urban core. Bedford is just inside this threshold and actually lies within the labor market area of nearby Roanoke. The Lynchburg region's average commute time (22.9 minutes) is within 20 percent of that in the benchmarking regions and below the national average (25.7 minutes). Thus, while the region is constrained by the size of its labor market, most commuters experience relatively manageable commutes.

¹⁸⁵ <http://lbdc.com/> (Lynchburg); <http://www.brazosvalley.sbdcnetwork.net/brazosvalley/Consulting1.asp> (College Station-Bryan); <http://www.alliancesbdc.com/> (Merced); <http://www.sbtcd.org/> (North Carolina)

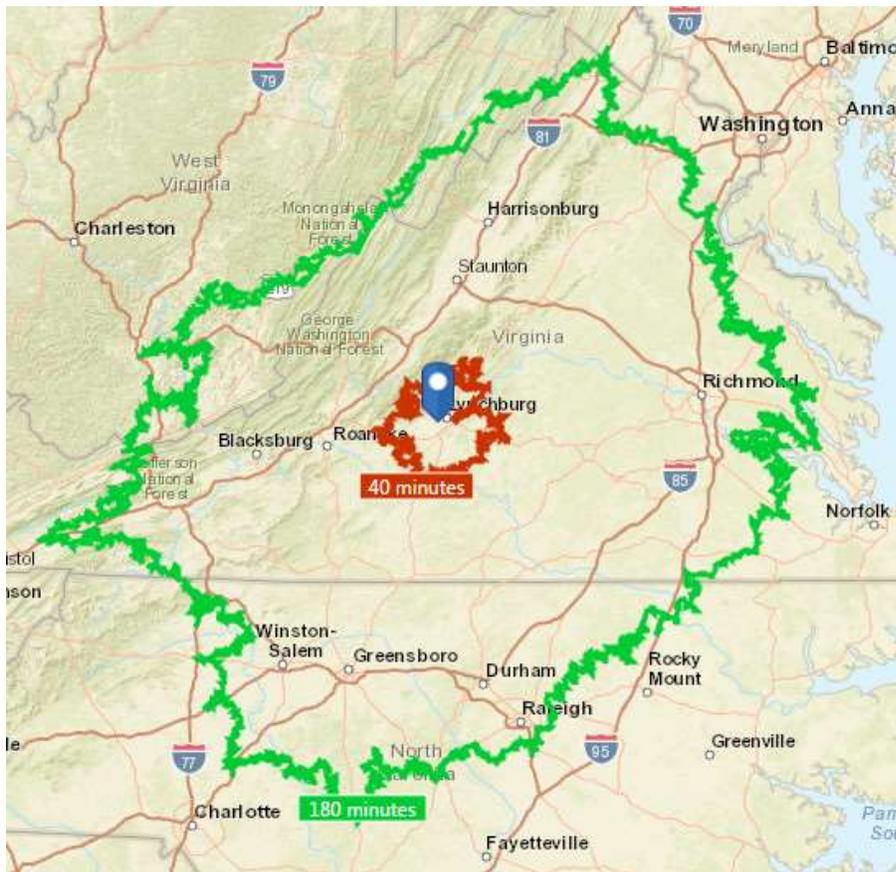
¹⁸⁶ <http://www.sbtcd.org/services/>

¹⁸⁷ <http://www.america2050.org/megaregions.html>

¹⁸⁸ NCHRP Report 786 Assessing Productivity Impacts of Transportation Investments. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_786.pdf

Lynchburg lags both College Station and Merced in the size of its same-day regional travel market. This measure is calculated as the total employment located within a three-hour drive time of each region’s core, as a measure of the market area that can be reasonably accessed with a one-day return trip by truck or by someone driving for business. Larger same-day travel markets also unlock productivity gains from agglomeration economies, through a number of mechanisms including better matching between firms serving as both customers and suppliers, more cost effective management of supply chains and freight delivery, and increased potential for interaction and learning between firms. Lynchburg outperforms Wilmington, NC on this metric. The region’s performance with respect to this metrics aligns with perception by many that the region is relatively remote, simply because of its geographic location. While Richmond, Greensboro, and Raleigh are inside the threshold for easy one-day drive times, Washington, DC, the Hampton Roads area, and Charlotte are more than three hours from Lynchburg’s core. This also points to the importance of other modes (air, rail) of intercity transportation in maintaining Lynchburg’s inter-regional connectivity.

Figure 29 Market Access – Lynchburg



Source: ESRI Business Analyst Online.

Lynchburg's Amtrak service is one of the region's greatest connectivity assets. Among the comparison regions, only Merced has Amtrak service. The two regions are also similar in their distance from an Interstate and limited air service. Downtown Merced is 36 miles from the nearest interchange I-5 while downtown Lynchburg is 37 miles from the nearest interchange with I-81.¹⁸⁹ With regard to air service, Lynchburg Regional Airport has one nonstop commercial destination (Charlotte)¹⁹⁰ while Merced Regional Airport/Macready Field has two (Oakland and Los Angeles) through what was formerly a charter air service, Boutique Air.¹⁹¹ College Station-Bryan's Easterwood Airport offers two nonstop destinations and Wilmington International Airport offers four (five on the weekend).

For both air and rail service, Lynchburg distinguishes itself from Merced in terms of usage. Lynchburg Regional Airport serves close to 79,000 passengers annually compared with around 2,000 at Merced Regional. (Merced's low number of enplanements likely reflects the fact residents can travel 60 miles to Fresno Yosemite International Airport for more service options.) Easterwood Airport serves over 90,000 passengers annually and Wilmington International serves close to 380,000, reflecting the region's status as a tourist destination.

On the rail side, although Merced's Amtrak station served about 128,000 passengers in 2014 to Lynchburg's 85,000, recent ridership growth rates in Lynchburg have far exceeded those in Merced. According to the National Association of Railroad Passengers, Lynchburg ridership grew by 244 percent between 2008-2014. During the same period, Merced ridership grew by 35 percent. In other words, Lynchburg's average annual growth rate of 41 percent was higher than Merced's six-year growth rate. This reflects the Lynchburg region's positive response to additional regional intercity rail service funded by the Commonwealth, starting in 2009.

Lynchburg is subject to national trends in airline consolidation to larger hub airports,¹⁹² making Amtrak connectivity of even greater strategic importance in the long-run. The Federal Aviation Administration predicts that, over the next 20 years, "Large and medium hubs will see much faster increases than small and non-hub airports..."¹⁹³ It therefore behooves Lynchburg to track the industry's consolidation, and carefully balance efforts to maintain and/or improve air service with those designed to expand alternate means of achieving inter-regional connectivity. Connections to Washington, D.C., as a major urban center with national and international significance, are particularly important in this respect.

In a similar vein, the Merced region considers Amtrak service a major asset, and does not appear to prioritize improvements in air service over improvements in rail service. The region's most recent long-

¹⁸⁹ Google Maps

¹⁹⁰ <http://www.lynchburgva.gov/airline-information>

¹⁹¹ <https://www.boutiqueair.com/p/schedule>; <https://www.boutiqueair.com/p/about>

¹⁹² A more in-depth analysis of trends affecting small community air service can be found in a recent publication by the MIT International Center for Air Transportation: "Trends and Market Forces Shaping Small Community Air Service in the United States" Available at:

<https://www.lawa.org/uploadedFiles/ONT/pdf/Trends%20and%20Market%20Forces%20Small%20Community.pdf>

¹⁹³ http://www.faa.gov/data_research/aviation/aerospace_forecasts/media/Forecast_Highlights.pdf

range transportation plan, adopted in 2014, states the following: “Currently, each of the airport facilities in the county are [sic] meeting the basic needs of the public.”¹⁹⁴

California’s high speed rail plan includes a stop in Merced—a development the regional transportation plan anticipates and supports.¹⁹⁵ Texas’s high speed rail plan indicates that there will be a stop in the Brazos Valley, a multi-county area that includes College Station-Bryan.¹⁹⁶ The most recent transportation plan for the College Station-Bryan metro acknowledges the fact that, while the planned high speed rail routes do not pass through Brazos County, “the proximity of the HSR will have an impact on transportation within the [MPO’s] planning area.”¹⁹⁷

While not on a planned high-speed rail corridor, opportunities may also exist for Lynchburg to derive benefit from state high speed rail efforts. Plans for the Southeast High Speed Rail corridor do not include a stop in Lynchburg. However, because the Tier I EIS for the Washington, D.C. to Richmond corridor recommended use of existing rail infrastructure, corridors, and railroad right-of-way,¹⁹⁸ the Lynchburg region may nevertheless benefit from infrastructure upgrades and speed improvements in the corridor, and may have opportunities to coordinate service via Amtrak connections to Greensboro and Washington, DC.

Innovation

Where economic development efforts historically focused on attracting large employers to relocate from one region to another, the state of the practice has evolved to consider the role that entrepreneurs and innovative activities play in overall growth. Small firm size and high rates of patent production are in fact good predictors of future employment growth. While corporate relocations have the potential to bring many jobs to a region, long-term prosperity is more likely to come from fostering entrepreneurs who start “home grown” companies that, if successful, eventually become significant employers.¹⁹⁹ Thus, small average firm size is a good indicator of economic health in the long run. Venture capital is also an important facilitator of this dynamic: research shows that early-stage funding can drive regional start-up activity among entrepreneurs waiting to start companies until there is a likely chance they will receive funding.²⁰⁰ The Innovation Index, a composite indicator developed by the U.S. Economic Development Administration, encapsulates these measures and more.²⁰¹

¹⁹⁴ <http://www.mcagov.org/DocumentCenter/View/314>

¹⁹⁵ http://www.hsr.ca.gov/docs/about/business_plans/2016_BusinessPlan.pdf

¹⁹⁶ <http://www.texascentral.com/project/>

¹⁹⁷ http://bcsmmpo.org/files/9414/1822/5891/FINAL_2040_MTP_20141203.pdf

¹⁹⁸ <http://www.dc2rvarail.com/about/project-history/>

¹⁹⁹ Aaron Chatterji, Edward Glaeser, and William Kerr, “Clusters of Entrepreneurship and Innovation,” prepared for the Innovation Policy and Economy Forum (2013), http://www.hbs.edu/faculty/Publication%20Files/130424-CGK-IPE_45be2057-0f20-4dc2-98d4-e422198bd55c.pdf.

²⁰⁰ Sampsa Samila and Olav Sorenson, “Venture capital, entrepreneurship and economic growth,” Social Science Research Network (2009), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1183576.

²⁰¹ http://www.statsamerica.org/innovation/innovation_index/weights.html

Lynchburg lags the selected peer regions on a number of innovation indicators.

According to data collected from 1997-2007, the Lynchburg MSA has an Innovation Index of 87 out of 100. This compares with a value of 91 for the College Station-Bryan MSA, 81 for the Merced MSA, and 98 for the Wilmington MSA. One contributing factor to Wilmington's high performance in this area is establishment size. The average Wilmington firm has 12 employees, whereas the average Lynchburg firm has 16—the largest among the sample. Lynchburg's economy includes a significant number of large employers, with 1.47 large establishments (500+ employees) per 10,000 workers in the period 1997-2011, compared to just 0.41 and 0.65 for College Station and Wilmington, respectively.²⁰² The take-away regarding firm size is nuanced: While large firms can be a risk factor for economic resilience, they can also be an asset in terms of offering the capital and labor resources to fund research and support innovation. Lynchburg also lags behind two of the selected peers in patent production. Between 2000-2013, inventors in College Station-Bryan and Wilmington filed over 600 patents, while inventors in Lynchburg filed 417.

Also included in the Innovation Index is a measure of broadband access. Unfortunately, the data is only as recent as 2009. Nevertheless, the Lynchburg region is reported as lagging all three comparison regions with a particularly strong discrepancy relative to Wilmington, NC. This data aligns with views of community members collected during the CEDS process regarding the uneven access to broadband across the region, particularly in more rural locations.

Lynchburg and its peer regions have a variety of university-based and broader community programs aimed at supporting innovation.

Wilmington has a pervasive culture of entrepreneurship. UNC Wilmington, like numerous colleges and universities located throughout the U.S.,²⁰³ has a center dedicated to promoting innovation and entrepreneurship, as does the University of California, Merced (although it belongs to a larger University of California program).²⁰⁴ When the Center for Innovation and Opportunity (CIE) opened in 2013, its executive director described it as a “multipurpose accelerator, incubator, co-working space’ and all around way to help entrepreneurs become smart, sustainable and able to thrive independently.”²⁰⁵ The wider Wilmington community also fosters and promotes an “entrepreneurial ecosystem.” . Every year, the Greater Wilmington Business Journal, together with UNC Wilmington's CIE, holds a Coastal Entrepreneur Awards ceremony.²⁰⁶ Encouragingly, Lynchburg has a similar award: The TechEDGE awards presented every year by the Lynchburg Region's Technology Council.²⁰⁷ In addition, the local Wilmington chamber of commerce actively markets the region as a center of innovation, stating on its website²⁰⁸:

²⁰² Detailed statistics available at: http://www.statsamerica.org/innovation/innovation_index

²⁰³ https://www.eda.gov/pdf/The_Innovative_and_Entrepreneurial_University_Report.pdf

²⁰⁴ <http://uncw.edu/cie/>; <http://ucop.edu/innovation-entrepreneurship-initiative/>

²⁰⁵ <http://portcitydaily.com/2013/08/16/uncw-entrepreneurship-center-poised-to-make-wilmington-an-innovation-beacon-director-says/>

²⁰⁶ <http://www.wilmingtonbiz.com/eventDetails?eventID=61#eventDetails>

²⁰⁷ <http://www.techcouncil.us/techedge/>

²⁰⁸ <http://wilmingtonchamber.org/index.php?c=blogdetail&id=90>

Entrepreneurial spirit has become a calling that has attracted many from across the country, prompting Fortune Small Business to rank Wilmington #14 in its rating of the Best Places to Launch a Business (2009). Entrepreneurial efforts are supported by...the Cape Fear Community College Small Business Center, the Small Business Technology Development Center, the Chamber's Cape Fear Future initiative, Wilmington Downtown, Inc. and more.

College Station-Bryan, too, works to create an entrepreneurial culture among local residents and college students, primarily with the support Texas A&M. The university's Center for New Ventures and Entrepreneurship facilitates partnerships between students and mentors, but also opens its Start-Up 101 workshop series to community members.²⁰⁹ Beyond the university, BCS Startup provides a number of services to local entrepreneurs. The organization fosters the local ecosystem by "centralizing 'all things startup'...through events and software tools."²¹⁰ BCS offerings include a "startup resource map," an app that connects entrepreneurs with mentors, co-working space, and a number of networking opportunities.

The Lynchburg Young Entrepreneurs Academy (YEA!) helps middle school and high school students through the process of creating a business plan and eventually launching an actual business. YEA! is a national program supported by the Kauffman Foundation. In January 2016, the Lynchburg Office of Economic Development (LOED) and Lynchburg Economic Development Authority (LEDA) received one of only seven Virginia Community Business Launch Grant awards.²¹¹ Funding will support four programs: a website that connects local businesses and entrepreneurs; nine-week entrepreneurial training workshop; business launch competition; and in-kind accounting, legal, web development, and graphic design service offerings.

Liberty University's Center for Entrepreneurship is primarily an academic and mentoring endeavor, with community interaction limited to a relationship with local angel investors.²¹² This is also the case at UC Merced, where its Pathways to Innovation program is limited to undergraduate students.²¹³ Similarly, the Entrepreneurship Education Program at Lynchburg College is focused on teaching and, like YEA!, meant for young students instead of working-aged individuals who are most likely to become entrepreneurs.²¹⁴ The Small Business Development Center at Central Virginia Community College, on the other hand, has community office hours and other educational programming targeted at small businesses within the community as a whole. The Lynchburg region also benefits from entrepreneurship support programs run by the non-profit Lynchburg Business Development Center.

²⁰⁹ <http://mays.tamu.edu/center-for-new-ventures-and-entrepreneurship/>

²¹⁰ <http://bcsstartup.com/>

²¹¹ <http://blog.opportunitylynchburg.com/community-business-launch-grants>

²¹² <https://www.liberty.edu/academics/business/?PID=25465>

²¹³ <http://www.ucmerced.edu/news/2014/uc-merced-chosen-pioneer-entrepreneurial-program>

²¹⁴ [http://www.lynchburg.edu/academics/academic-community-centers/center-for-economic-education/entrepreneurship-education-program/;](http://www.lynchburg.edu/academics/academic-community-centers/center-for-economic-education/entrepreneurship-education-program/)

http://www.kauffman.org/~media/kauffman_org/research%20reports%20and%20covers/2015/05/kauffman_ind_ex_startup_activity_national_trends_2015.pdf

In 2012, Region 2000 announced its Higher Education Entrepreneurship Initiative, an effort designed to “[promote] cross-campus collaboration and growing student interest in entrepreneurship.”²¹⁵ In doing so, the Region 2000 Economic Development Council Director envisioned a “framework for all in the region to look at entrepreneurship as a viable career choice,” indicating that the Initiative was meant to benefit local residents as well as students. At the time, a working group established four action items—conduct a student survey, establish a student entrepreneurship council, offer consulting services, and hold a cross-campus competition—but it is unclear what their current status is.

Based on experience and data from the peer regions, Lynchburg would likely benefit from a balanced approach to entrepreneurship, supporting individuals as well as small, mid-size, and large firms in pursuit of innovation, and linking university-based and community-wide initiatives. Ideally, innovation-oriented efforts would unite interests across higher education institutions, large employers, and other members of the community—with programs that are open to students, existing entrepreneurs, and aspiring innovators. An ongoing challenge for any region engaged in these efforts is to maintain (and fund) coordinated efforts over time, looking beyond programs that are open to one single constituency and translating short-term funding (such as the Virginia Community Business Launch Grant) into enduring programs. While challenging, these efforts are key to encouraging the type of entrepreneurial ecosystem found in aspirational regions like Wilmington.

Finally, the Lynchburg region could benefit from looking beyond higher education institutions alone as drivers of innovation to instead work with local manufacturers who may routinely innovate but lack the capacity or expertise needed to scale and eventually export their products to broader global markets. Other small- to mid-sized regions have provided this support by developing Metro export plans, following guidance offered by the Brookings Institute. Experience from other regions has shown that a focus on exports can serve as unifying platform for more metro-level economic development efforts and means of overcoming tendencies towards intra-regional competition.²¹⁶

Human Capital

Despite the Lynchburg region’s concentration of colleges and universities, the share of its residents with an associate’s degree or higher (32%) is lower than that in College Station-Bryan (39%) and Wilmington (43%). Many researchers now use educational attainment—usually described in terms of residents with a college degree—as a proxy for human capital. A large body of academic literature supports the critical role human capital plays in regional growth,²¹⁷ especially in skill- or STEM-intensive industries, but also in

²¹⁵ <http://www.region2000.org/index.php?id=1243>

²¹⁶ More information available at: <http://www.brookings.edu/about/projects/state-metro-innovation/mei>

²¹⁷ Curtis J. Simon, 1998, “Human Capital and Metropolitan Employment Growth,” *Journal of Urban Economics* 43: 223-243; Curtis J. Simon and Clark Nardinelli, 2002, “Human capital and the rise of American cities, 1900-1990,” *Regional Science and Urban Economics* 32: 59-96; Paul D. Gottlieb and Michael Fogarty, 2003, “Educational Attainment and Metropolitan Growth,” *Economic Development Quarterly* 17(4): 325-336; Jesse M. Shapiro, 2006, “Smart Cities: Quality of Life, Productivity, and the Growth Effects of Human Capital,” *The Review of Economics and Statistics* 88(2): 324-335; Curtis J. Simon, 2004, “Industrial reallocation across US cities, 1977-1997,” *Journal of*

less skilled industries as a result of multiplier effects.²¹⁸ Much of Lynchburg’s forecast employment growth in business services and health care will demand an educated workforce.

Human capital is also significant in enabling technology adoption and associated labor productivity increases that facilitate continued growth in manufacturing output, despite employment losses.²¹⁹ While traditional manufacturing jobs did not in the past require a college degree, there is increasing demand for skilled workers able to work in highly automated environments, performing non-routine tasks that require more advanced STEM education.²²⁰ Moreover, manufacturing nationwide is facing a skills gap.²²¹

Lynchburg’s lower level of human capital relative to College Station-Bryan and Wilmington may be a lingering effect of its past dependence on manufacturing and other industries that did not require a college degree. **As its regional economy becomes more reliant on highly-skilled workers, even within the manufacturing sector, Lynchburg will need to increase its stock of human capital in order to compete with other regions.**

Quality of Life

Increasingly, cities through the U.S. compete with one another for talent. Given the importance of human capital described above, many regions now work hard to create the conditions needed to attract skilled workers. This represents a shift from “smokestack chasing,” a strategy practiced for decades that attempted to influence the relocation decisions of firms instead of workers.

One of the primary ways that regions attract skilled workers is by improving the appeal of their central cities. *The Young and Restless and the Nation’s Cities*, an influential report on the migration patterns of 25-34-year-olds with a college degree, finds that this demographic has a stronger observed preference for living in “close-in urban neighborhoods” than at any other time since 1980.²²² (Other research questions whether preferences have actually changed, but the prevailing wisdom generally relies on migration patterns.²²³) Also, businesses themselves accelerate this trend by moving from suburban settings to central cities in response to perceived worker preferences.²²⁴ For example, Norfolk, VA just announced its largest major employer win in a decade, the attraction of ADP. In describing the city’s competitive edge,

Urban Economics 56: 119-143; and Edward L. Glaeser and Jesse M. Shapiro, 2003, “Urban Growth in the 1990s: Is City Living Back?,” *Journal of Regional Science* 43(1): 139-165 are just a few.

²¹⁸ Unskilled industries experience employment growth partly because of the multiplier effect generated by skilled industries and (Simon 2004).

²¹⁹ Simon 2004.

²²⁰ Manufacturing Institute. Roadmap for Manufacturing Education.

<http://www.themanufacturinginstitute.org/~media/DDB4265AC2F243FB97AEBA2A56CC7523.ashx>

²²¹ Deloitte. The skills gap in U.S. manufacturing 2015 and beyond.

<http://www.themanufacturinginstitute.org/~media/827DBC76533942679A15EF7067A704CD.ashx>

²²² <http://cityobservatory.org/wp-content/uploads/2014/10/YNR-Report-Final.pdf>

²²³ <http://uli.org/wp-content/uploads/ULI-Documents/Gen-Y-and-Housing.pdf>

²²⁴ <http://www.wsj.com/articles/SB10001424052702304281004579222442197428538>

chairman of the Hampton Roads Economic Alliance cited the city's walkable downtown environment and "urban feel."²²⁵

The authors of *The Young and Restless and the Nation's Cities* argue that there are several reasons for focusing workforce attraction efforts on young workers: they are most likely to move, more adaptable in the workplace, typically less costly than more experienced workers, and have skillsets that today's businesses require. Young workers also contribute to entrepreneurial activity; citing an academic study, *Young and Restless* states that startups "tend to disproportionately employ younger workers, and the number of firms grows faster in places with an abundant supply of young workers."²²⁶

Commentators on this phenomenon often cite an overarching transportation- and land use-related factor that attracts young workers: the ability to reach more destinations without a car, i.e., the ability to use cars less.²²⁷ Also, communities that enable a car-free lifestyle naturally have higher densities and more multi-family housing.

With regard to costs of living, housing and transportation affordability is also a major concern among young workers. Municipalities are in a unique position to influence the number of transportation and housing options available to residents. According to the Center for Neighborhood Technology (CNT), the average household in the Lynchburg region spends 58 percent of its income on housing and transportation (28% housing/29% transportation). Lynchburg is affordable relative to its peers, with College Station households spending 65 percent of their income on housing and transportation (34%/30%), Merced spending 67 percent (34%/33%), and Wilmington 59 percent (33%/26%). Nevertheless, neither Lynchburg nor the three peer regions falls below the 45 percent threshold deemed to be "affordable" by CNT research for combined housing and transportation costs. This points to relatively spread-out nature of activities in the region, despite low congestion and relatively low-cost housing. Another indicator of Lynchburg's relatively high quality of life is that the region's poverty rate is lowest among its peers. **As demand grows for urban living, the region will need to work to maintain its relative cost advantage by ensuring that housing supply keeps pace, while encouraging "location-efficient" land use patterns that will not erode the region's currently low-levels of congestion and quality natural environment.**

The City of Lynchburg also out-competes by some margin the primary cities in each of the peer regions in terms of overall livability as measured by the AARP Livability Index. The index covers a large number of measures in seven livability categories: transportation, housing, civic and social engagement, the environment, opportunity and inclusion, health, and neighborhood access. Lynchburg has a Livability Index of 56, compared with 52 in Wilmington, 47 in College Station-Bryan, and 39 in Merced. None of the four regions score above average in any of the seven livability areas, meaning they each have strengths as well as ample room for improvement. Lynchburg is particularly strong with respect to regional air

²²⁵ http://pilotonline.com/business/jobs/adp-says-it-will-hire-mostly-locals-for-jobs-in/article_091af4e5-16ae-5e5c-aaf0-a343778c05b0.html

²²⁶ Paige Ouimet and Rebecca Zarutskie, 2014, "Who works for startups? The relation between firm age, employee age, and growth," *Journal of Financial Economics* 12(3): 386-407.

²²⁷ <https://www.washingtonpost.com/news/wonk/wp/2014/10/14/the-many-reasons-millennials-are-shunning-cars/>

quality, patient satisfaction with health care, civic engagement,²²⁸ social engagement, a variety of housing factors including affordability and the availability of multi-family housing.²²⁹ The Lynchburg scores show room for improvement on a number of “urban character” variables such as transit access, jobs accessibility, and destination diversity at a neighborhood level. **Because Lynchburg has lagged behind its peers in recent young adult population growth, livability factors that appeal to the young working population are particularly important.**

SUMMARY

Table 26 summarizes in words the detailed findings of the peer region analysis. (Table 27 presents a side-by-side comparison of all quantitative metrics).

Table 26 Peer Region Analysis – Summary of Comparative Findings

Category	Comparative Findings
Economic health	Lynchburg has struggled with job loss and loss of young adult population alongside slow population/value added growth overall.
Cost of Doing Business	Compared with the selected peer regions, Lynchburg’s business climate falls somewhere in the middle.
Connectivity	<ul style="list-style-type: none"> – The region is constrained by the size of its labor market, but most workers experience relatively manageable commutes. – Lynchburg lags both College Station and Merced in the size of its same-day regional travel market. This finding aligns with perception by many that the region is relatively remote and also points to the importance of other modes (air, rail) in maintaining Lynchburg’s inter-regional connectivity. – Lynchburg’s Amtrak service is one of the region’s greatest connectivity assets. – Lynchburg is subject to national trends in airline consolidation to larger hub airports, making Amtrak connectivity of even greater strategic importance in the long-run.
Innovation	There is room for improvement with respect to innovation, relative to peer regions. Lynchburg would likely benefit from a balanced approach to entrepreneurship, supporting individuals as well as small, mid-size, and large firms in pursuit of innovation, and linking university-based and community-wide initiatives.

²²⁸ Measured by the number of civic, social, religious, political, and business organizations per 10,000 people and by the voting rate.

²²⁹ Measured by the number of performing arts companies, museums, concert venues, sports stadiums, and movie theaters per 10,000 people.

Human Capital

Lynchburg invests in K-12 education and has a high availability of higher education opportunities, but nevertheless lags in educational attainment. As its regional economy becomes more reliant on highly-skilled workers, even within the manufacturing sector, Lynchburg will need to increase its stock of human capital in order to compete with other regions.

Quality of Life

Lynchburg is particularly strong with respect to housing costs, regional air quality, patient satisfaction with health care, and civic and social engagement. There is room for improvement on a number of “urban character” variables such as transit access, jobs accessibility, and destination diversity at a neighborhood level. Given Lynchburg’s lag in young adult population growth over time, livability factors that appeal to the young working population are particularly important.

Table 27. Summary of Peer Region Comparison

	Lynchburg, VA MSA	College Station- Bryan, TX MSA	Merced, CA MSA	Wilmington, NC MSA	Source
Economic Performance & Structure					
Total population growth, 1998-2013	0.9%	1.9%	1.8%	2.1%	U.S. Cluster Mapping Project
Young adult population growth (18-34 years old), 1998-2013	-0.9%	1.5%	1.2%	0.9%	U.S. Cluster Mapping Project
Employment growth, 2009-2013	-2.2%	5.5%	6.8%	2.1%	Moody's Analytics
Value added (GDP) growth, 2009-2013	1.4%	14.6%	3.1%	8.9%	Moody's Analytics
Industry diversity percentile	64 th	53 rd	65 th	90 th	Appalachian Reg. Commission
Cost of Doing Business					
Average compensation per job, 2014	\$50,022	\$47,803	\$50,247	\$50,729	U.S. Bureau of Econ. Analysis
Average state industrial electricity price (\$/kWh), 2016	\$0.069	\$0.051	\$0.105	\$0.062	U.S. Energy Information Agency
State taxes (local and state) as percent of GDP, 2012	8.6%	8.1%	10.5%	8.8%	U.S. Cluster Mapping Project
Connectivity & Market Access					
Interstate				✓	Google Maps
Mean travel time to work	22.9	18.9	26.3	21.9	ACS 2014 5-year, U.S. Census
Nonstop commercial airline destinations at regional airport	1	2	2	4	Airport websites/U.S. DOT
Enplanements at regional airport (2014)	78,876	91,127	2,018	378,203	Federal Aviation Administration
Amtrak ridership growth, 2008-2014	244%	No Amtrak	34.5%	No Amtrak	Amtrak
Planned high speed rail stop^a		✓	✓		See footnote
16+ Civilian Employed Population within 40-minute drive time (labor market)	91,161	116,170	157,279	140,196	Esri, InfoUSA
Employment within three-hour drive time (same-day travel)	3,673,800	7,143,800	6,170,000	2,405,800	Esri, InfoUSA
Drive time to closest intermodal rail terminal	2:10 (Greensboro)	1:45 (Houston)	1:10 (Stockton)	3:15 (Greensboro)	Google Maps, Intermodal Assoc. of North America
Drive time to nearest major marine port	3:40 (Hampton Roads)	2:05 (Houston)	2:05 (Oakland)	3:30 (Charleston)	Google Maps, Intermodal Assoc. of North America

Innovation					
Innovation Index^b	87/100	91/100	81/100	98/100	Economic Development Admin.
Average firm size (workers per firm), 2013	16	14	14	12	Cluster Mapping Project
Patents, 2000-2013	417	670	87	610	U.S. Patent & Trademark Office
Human Capital					
Population over 25 with associate's degree or higher, 2014	32%	39%	20%	43%	American Community Survey
Number of colleges and universities	4	2	2	2	Peterson's
Public K-12 spending per student (school district), 2014-2015	\$10,955	\$13,488 (Station) \$9,026 (Bryan)	\$8,286 (elem.) \$12,962 (HS)	\$8,390	Center for Education Statistics and <i>Governing</i> magazine
Quality of Life					
Livability Index (primary city)^c	56	47	39	52	AARP Public Policy Institute
Housing and transportation costs as share of household income	58%	65%	67%	59%	Center for Neighborhood Tech.
Poverty rate	15.4%	26.5%	24.8%	18.8%	U.S. Cluster Mapping Project

^a Information on high speed rail stops: <https://www.houstonpublicmedia.org/articles/news/2015/10/15/124620/high-speed-rail-would-include-a-stop-in-college-station/>;
http://www.hsr.ca.gov/docs/programs/statewide_rail/Proposed_Statewide_Alignment_Map.pdf

^b The Innovation Index contains the following metrics collected from 1997-2007 that are not otherwise captured in this analysis: employment in select number of technology-based industries (and share of total employment), establishment churn (births divided by deaths), venture capital investment, and broadband density (connections per 1,000 households).

^c The Livability Index contains a litany of metrics collected from 2007-2014 on housing, accessibility (to a range of amenities), environmental quality, health quality, civic engagement, opportunity (economic and social).